Put Video In Your Pocket (page 96) ■ Docking Stardock's DesktopX (page 74)

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COMPUTER POWER USER

Q&A With Tiffany Schlain

The Creator Of The Webby Awards Talks About The Internet

(page 108)

Video Card Roundup

6800 Ultra & X800 XT

(page 16)

RFID

Big Benefits Or Big Brother?

(page 40)

Customize Your Firewall

Built-In Linux, Part I

(page 99)

HACK YOUR HARDWARE

page 46

September 2004 • Vol. 4 Iss. 9

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On Page 32.

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Lighten your day by accessing your office PC from home and finishing work when it's convenient for you. Imagine… you'll leave the office early, beat rush hour traffic, spend more time with family and avoid going into the office on weekends. GoToMyPC is the ultimate productivity tool, letting you work where you want, when you want.

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Email: Rick Miller

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scheduling for next week — Wed 3/3/2004 9:00 AM
How is the presentation coming? — Wed 3/3/2004 8:33 AM
review this case study — Wed 3/3/2004 8:10 AM
PLEASE READ - Revise for 5pm... — Wed 3/3/2004 7:44 AM
conference call instructions for offsite.. — Wed 3/3/2004 12:38 AM
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September 2004 • Vol 4 Issue 9

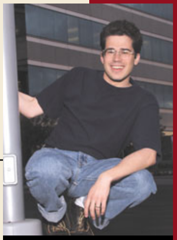
Frontside

6 **What's Happening**
12 **Digital Economy**
14 **The Saint**
Building A Quantum Computer

The Experts

Joan Wood
Forward Slash
page 88

Kyle Bennett
[H]ard Talk
page 24



Chris Pirillo
Dialogue Box
page 78

Alex St. John
The Saint
page 14

Anand Lal Shimpi
Anand's Corner
page 22

Mike Magee
Shavings From The Rumour Mill
page 102

Alex "Sharky" Ross
The Shark Tank
page 23

Rob "CmdrTaco" Malda
The Department Of Stuff
page 86

Pete Loshin
Open Sauce
page 79

Spotlight

46 **Hack History**
Home-Brewed Hardware Enhancements

50 **Hack Your Hardware**
Modding Tips & Tricks For The Hardcore
  50 Lap Heatsink/CPU
  52 ATI Radeon 9800 Pro
  54 Mask An Optical Drive
  55 ATI Radeon X800 Pro
  55 Region-Free DVD Player

58 **Pry Open Your PVR**
TiVo & ReplayTV Under The Knife

64 **Make A Bigger, Better Digital Device**
Modify Your MuVo2, Nokia 6800 & Canon Digital Rebel

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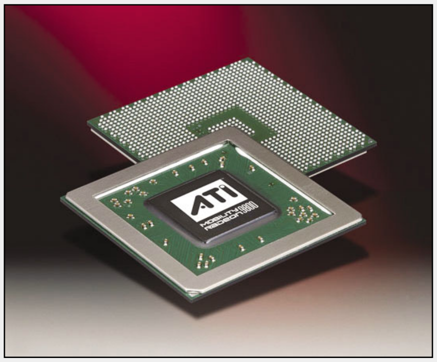


Heavy Gear

15 **Dream Hardware**

16 **What's It Going To Be?**
GeForce 6800 Ultra & Radeon X800 XT
Video Card Roundup

19 Mobility Radeon 9800 Preview
Zalman ZM80D-HP GPU Cooler

20 ADS Tech Instant TV
Shuttle SB81P XPC

22 **Anand's Corner**
Intel's New Pentium 4 . . . Again

23 **The Shark Tank**
NVIDIA Gets SLI (Take 1)

24 **[H]ard Talk**
NVIDIA Gets SLI (Take 2)

Hard Hat Area

26 **PC Modder**
Tips & Tutorials
27 **Building "Spike"**
The Diary Of A Modder's Creation, Part III

32 **Dream Hardware**
Hypersonic Fusion DV
36 **Advanced Q&A Corner**
38 **X-ray Vision:** Batteries
The Challenge For More Power
40 **White Paper:** RFID
Big Benefits Or Big Brother?

Loading Zone

68 **The Bleeding Edge Of Software**
Inside The World Of Betas
70 **Up To Speed**
Upgrades That'll Keep You Humming Along
71 **I Spy A Remover**
Apps That Put The Kibosh On Spyware
74 Stardock DesktopX 2.1 Enhanced
75 Cyberlink DVD Solution
MaxiVista 1.0.17
76 Opera 7.52
78 **Dialogue Box**
All Quiet On The Browser Front
79 **Open Sauce**
FUD-a-Palooza

Caught In The Web

80 **Get Your Domain On The Web . . . Now**
Shop For A URL & Reliable Host
84 **Coder's Corner: XML Schema, Part 3**
Complex Types & Type Declarations
86 **The Department Of Stuff**
openart.txt
88 **Forward Slash**
Productivity Overload

Digital Living

89 **Road Warrior**
Rest Stop Web Access, Mozart Does Wi-Fi, 802.16-2004 Gets The OK & More From The Mobile Front
91 **At Your Leisure**
Plug In, Sit Back & Fire Away

Tips & Tricks

96 **Software Tips & Projects**
Put Video In Your Pocket
99 **Warm Up To Penguins**
Customize Your Built-In Firewall, Part I

What's Cooking

102 **Shavings From The Rumour Mill**
AMD Readies Dual-Core CPUs
103 **Technically Speaking**
An Interview With Thad Starner, Director Of The Contextual Computing Group
106 **Under Development**
A Peek At What's Brewing In The Laboratory

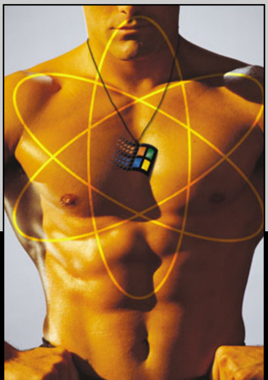
Back Door

108 **Q&A With Tiffany Shain**
The Creator Of The Webby Awards Talks About The Internet

Infinite Loops

Strange stats and other oddball items from computing's periphery

83, 85, 94, 100



GREETINGS FROM SAMITLAND

I've been looking forward to the fall and winter with great anticipation. The summertime tends to be slow on exciting news and product releases, but things gradually start to pick-up as the holidays begin to draw nearer. Also, an escape from the summer heat does wonders for my constitution—wife Julie always comments on how cranky I get in the heat, and she'd be right. You'd think heat would be a nonissue for someone who lived in India, Ghana, Jamaica and Nigeria for his first 18 years. Go figure. As usual, I'm off on a tangent, so let's get back on track . . . .

This month we're focusing on getting more out of your hardware. Head over to page 46 to see what I'm talking about. It's fun to hack your hardware, but getting said hardware to do more for the buck brings even greater satisfaction. Naturally, there are some inherent risks involved. Invalidation of warranty and loss of functionality if the hack is applied incorrectly can burst the bubble, but those risks won't keep the hardcore away from hard hacks. Go ahead and check out our hands-on approach; it's not for the faint of heart.

Do you recall when Sharky, Kyle, and I all slammed NVIDIA's marketing methods for the GeForce4 way back in the May 2002 issue of *CPU*? (You can read both of their columns in our online back issues at www.cpumag.com.) Our distaste (which was not discussed prior to print) was pretty unanimous. Sometimes things come full circle: It looks like all three of us have been eyeing NVIDIA's SLI options with great interest. The biggest drawback is that SLI will be punch-you-in-the-stomach expensive, but sometimes our passion works best without underwear and solid foods (savings for SLI). You can check out their SLI-related columns on pages 23 and 24 this month.

As I mentioned in last month's mag, this issue is our first with Dana Montey. She's stepped in to replace Jennie, and I'd like to welcome her to the team. Otherwise, life goes on. And before I forget, make sure you pick up the latest issue of *PC Modder* (v1.1) now on newsstands. Naturally, subscribers can read it online at www.cpumag.com/pcmodder04. I look forward to seeing you back in the October issue. Until then!

Samit G. Choudhuri, Publication Editor, *CPU*

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CORRECTIONS

On page 40 of the July issue, we said that the Samsung SyncMaster 213T has a 16ms pixel response time. We meant to say it has a 25ms response time.

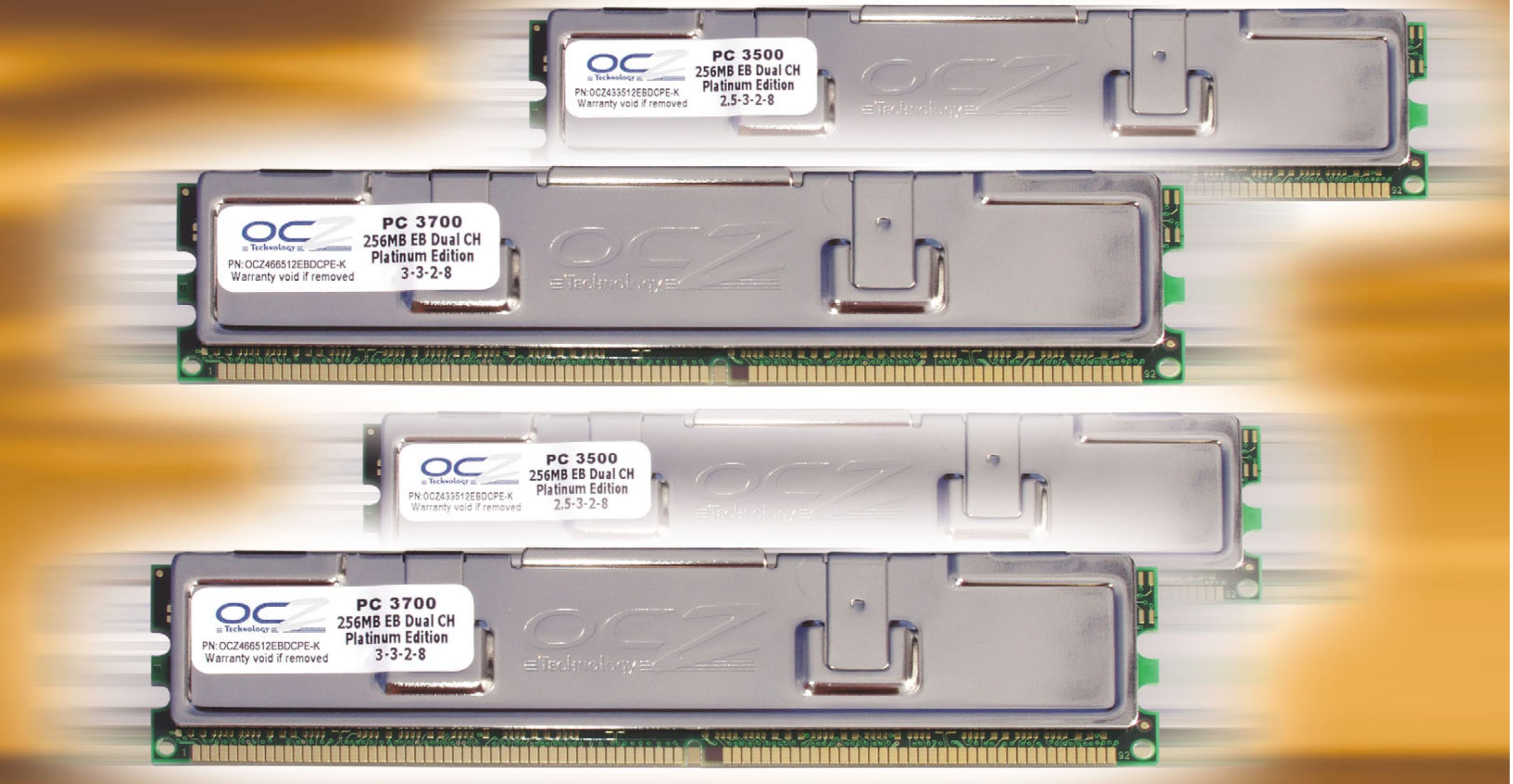
Gotcha.
Here it is.

OCZ Technology

www.ocztechnology.com

"GOT EB DDR?"

ENHANCED BANDWIDTH



SPECIFICATIONS

PC3200 DDR400 CL 2.5-3-2-8
PC3500 DDR433 CL 2.5-3-2-8
PC3700 DDR466 CL 3-3-2-8

512MB (2x256MB) and 1GB (2x512MB) Dual Channel Kits

Mirrored Platinum Copper Heatspreader
2.8Volts
Lifetime Warranty

DESCRIPTION

Enhanced Bandwidth (EB) technology is a means of increasing memory bandwidth through the optimization of memory latencies for the best possible interaction between the system memory and the chipset and memory controller. It uses low tRP and tRCD latencies in combination with a Variable Early Read Command to allow for the highest possible effective data bandwidth. In most applications, the 2.5-3-2 (CL-tRP-tRCD) will deliver bandwidth that is indistinguishable from CL-2 modules.

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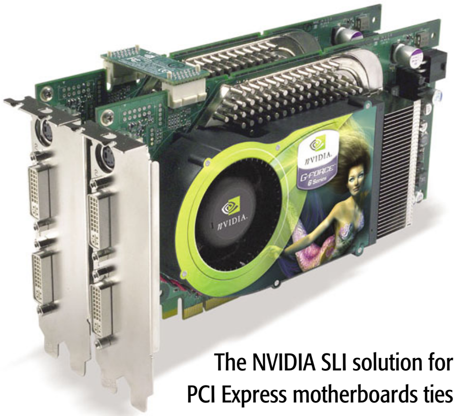
Steve Smith



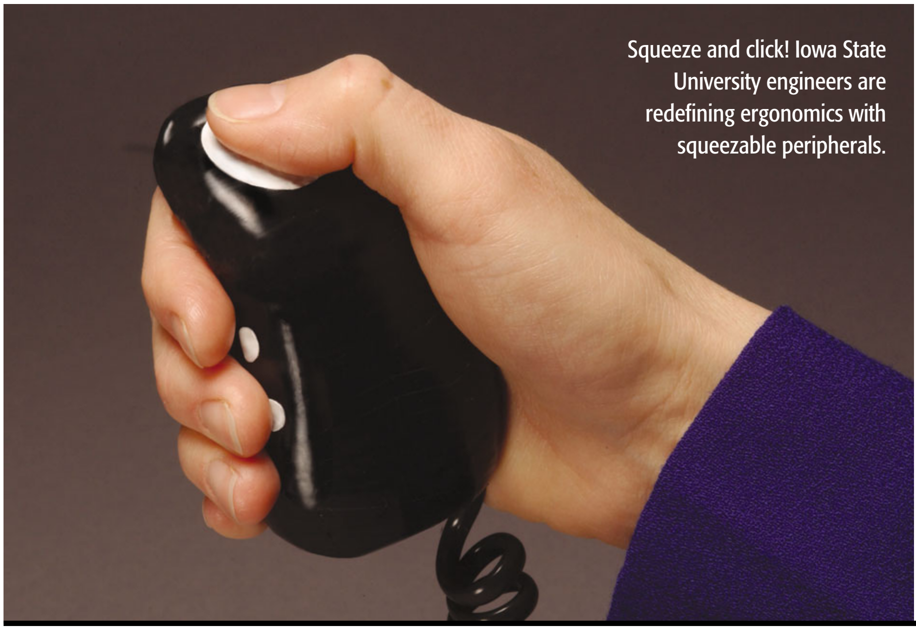
The NVIDIA SLI solution for PCI Express motherboards ties two high-end GeForce or Quadro cards together to deliver nearly twice the 3D performance of a single card in some applications.

NVIDIA SLI: Double The Accelerators, Double The Speed

If one 3D accelerator is fast, then two must be wicked fast, right? The upcoming NVIDIA SLI (Scalable Link Interface) solution connects two cards to deliver nearly double the 3D rendering speed of a single card in some applications. Designed for motherboards with multiple PCI Express slots, the technology divides the load for display drawing between the two identical GeForce 6800 Ultra/GT or Quadro FX 3400 PCI-E cards, while supporting software manages load balancing and bringing the two workloads together. Because all of the dual-card processes are enabled by the display drivers, they should supercharge any 3D application without modification. NVIDIA is already working with high-end PC manufacturers such as Alienware, Falcon Northwest, and Voodoo PC to start delivering SLI-powered PCs later this year. (You can read more about SLI in "The Shark Tank" on page 23.) ▲

Sony Micro Vault PRO: The 2GB Credit Card

Finally, a portable ministorage device that doesn't look like a disposable key-ring fob . . . or a decapitated thumb. No stranger to style, Sony packs a 1-inch 2GB hard drive into the 2- x 2.75-inch form factor of a common credit card. Well, at 0.5 inches thick, there will be no mistaking the Micro Vault PRO for an AMEX card. It does still need to accommodate a USB 2.0 connector that flips out as needed and hides back in the card for easier storage. Data transfers to and from the device at an average transfer rate of 10Mbps. Bundled Auto Synch software lets you configure the Micro Vault PRO to update specific files and folders whenever you reconnect. Sony sells the unit for $249.99. ▲



Squeeze and click! Iowa State University engineers are redefining ergonomics with squeezable peripherals.

The Incredible, Squeezable, Sponge Mouse

Give your PC mouse the hug and cuddle it always deserved. Combining mouse and joystick technology with a squeeze ball, mechanical engineers at Iowa State University invented a new pointing device to combat the dreaded carpal tunnel syndrome. You grasp the rubbery device in your hand and use the thumb on the top-side, pressure-sensitive button to control cursor movement and use your fingertips on the left/right mouse buttons on the controller's side. The design eliminates stress from extended arms, cramped fingers, and twitching wrists, and you can squeeze it to exercise those click-weary digits. Professors Abir Qamhiyah and Don Flugrad have a patent pending and are already thinking about a wireless version and adding a strap so that the mouse can stay hooked to your hand while you type. ▲

Linksys Extends Its Range

In order to extend the effective range for some of its wireless routers and access points, network hardware provider Linksys released new high-gain antennae that attach to select models supporting 802.11b and 802.11g standards. The company does not say precisely how much more wireless coverage the new add-ons will bring a network, but it promises that a pair of TNC Connector Antennas ($59.99) will increase both the effective strength of outgoing wireless signals and sensitivity to incoming signals. The product is FCC-approved to work with Linksys models WRT54GS, WRT-54G, WAP54G, BEFW11S4, and WAP11. A similar product is available for single-antenna bridges and access points, as well as an antenna stand that can be located up to 6 feet away from the main device to achieve even better reception. ▲

Linksys wireless routers get high-gain antennae to extend their 802.11b/g coverage in the home or office.

Hardware Mole

The Mother Of All Monitors

For those who can't spend enough on their dream machine, Viewsonic introduces the $7,999 VP2290b high-definition 22.2-inch LCD. With 9.2MP (megapixels) spread across a widescreen, this king of the LCDs packs 204 pixels per inch for a top screen resolution of 3,840 x 2,400. The pixel density is five times that of the typical LCD, Viewsonic promises. Who is this kind of power good for? Digital and science imaging professionals, as well as CAD designers who just can't get enough detail. But we are guessing that if you can pair the VP2290b with an ultra-fast 3D accelerator, you can play a mean session of Far Cry on this thing. ▲

E3 2005: Battle Of The Next-Gen Consoles

Prepare for a major hardware smackdown at next May's E3 (Electronic Entertainment Expo). Nintendo has already announced that it will preview its next-generation gaming console, code-named Revolution, and many expect Microsoft to show its Xenon successor to the Xbox. And now Sony's gaming head Ken Kutaragi just announced that a working version of the long-awaited Playstation 3 will debut at E3, as well. The PS3 will be powered by a new Cell CPU, developed jointly by Sony and Toshiba. It is rumored to be a parallel processing chip that delivers teraflop-level floating-point performance. ▲

DVD Recorder Prices Set To Dive

If you have been coveting a new (or newer) DVD burner, keep your credit card holstered just a short time longer. With 15 times the number of DVD recorders shipping so far this year from the most inexpensive source for such drives, Taiwan, MIC (a Taipei market research firm) predicts that DVD±R/RW unit prices could decrease as much as 50% from the current industry average of $280. Taiwanese manufacturers, which traditionally have been able to produce high-tech components more efficiently than many competing nations, is determined to chip away at Japan's current 50% share of the DVD-recorder market and become the second largest supplier to the world by shipping 3 million drives in 2004. ▲

What's Happening • Chip Watch

Compiled by Dean Takahashi

Tensilica Says Good-bye To Hand Coding Chip Designs

Tensilica has long billed itself as a maker of automated design tools that can help microprocessor designers create a chip in just an hour. It's moving closer to that goal, and now it has announced its XPRES compiler, which bypasses the painstaking process of describing a chip with a low-level hardware description language, known as hand coding. Using XPRES, a chip designer can create a chip algorithm in a high-level programming language such as C++ and feed that directly into the compiler. The compiler then works with Tensilica's Xtensa processor generator software to create a chip design that executes the C++ code in the fastest way possible. That chip design can be tested and taken directly to a chip factory. The compiler can analyze thousands of different versions of the chip to find the best design. So far, about 60 chipmakers have licensed Tensilica's technology. ▲

RFID Applications Continue To Spread

Wal-Mart has drawn attention for its use of RFID tags, which broadcast a unique ID when scanned by a reading device, but RFID chips are spreading just about everywhere. McCarron Airport in Las Vegas is using RFID to track baggage and speed its processing through bomb detection screenings. Chipco in Raymond, Maine, is embedding RFID in casino chips so casino operators can keep tabs on the fortunes and betting habits of casino patrons. The U.S. Army is using them to track the location and temperature of Meals Ready To Eat for soldiers. Privacy advocates are worried the tags will be used to track people surreptitiously. CASPIAN, a privacy group headed by Katherine Albrecht in the Boston area, has launched several boycotts against the use of what it dubs "spy chips." (For more on RFID technology, see "RFID: Big Benefits Or Big Brother?" on page 40.) ▲

Two Factions Propose Next-Gen Wi-Fi

Next-generation Wi-Fi networking is coming at speeds up to 500Mbps in a couple of years, but not without the obligatory standards battle. The technology could be many times faster than the current 20Mbps to 30Mbps throughput from the current 802.11a/g standards. Intel, Agere, Nokia, and Sony are leading one group proposing their own TGn Sync standard for 802.11n, which could become the prime technology for distributing high-def videos in the home over a wireless network. The other group is led by Texas Instruments, Broadcom, and Conexant. The groups are battling over how many radios to put into each chip. The TGn Sync group favors putting as little as two antennas and a wider 40MHz channel for data transfer. The chips will operate in the 5GHz spectrum but will be backward-compatible with 2.4GHz solutions. They are expected to debut in 2006. ▲

It's interesting to note that the pattern of data rates of 802.11 standards seems to increase by approximately five times.

802.11	**802.11b**	**802.11a/g**	**802.11n**
2Mbps x ~5 =	11Mbps x ~5 =	54Mbps x ~5 =	250Mbps

Source: Agere Systems

Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

Released	Original Price	Current Price (06/16/04)	Last Month's Price
AMD Athlon XP 3000+ 400MHz FSB			
5/26/2003	$280*	$147	$147
AMD Athlon XP 3200+ 400MHz FSB			
5/26/2003	$464**	$172	$177
AMD Athlon 64 2800+			
1/6/2004	$193**	$172	$172
AMD Athlon 64 3000+			
9/23/2003	$218**	$211	$211
AMD Athlon 64 3200+			
9/23/2003	$417**	$270	$270
AMD Athlon 64 3400+			
1/6/2004	$417**	$404	$404
AMD Athlon 64 3500+			
6/1/2004	$500**	$485	$500**
AMD Athlon 64 3700+			
6/1/2004	$710**	$700*	$710**
AMD Athlon 64 3800+			
6/1/2004	$720**	$696	$720**
AMD Athlon 64 FX-53			
3/18/2004	$733**	$749	$768
Intel Pentium 4 3.06GHz 533MHz FSB			
11/14/2002	$658*	$214	$208
Intel Pentium 4 3GHz 800MHz FSB			
4/21/2003	$417**	$211	$229
Intel Pentium 4 3GHz 800MHz FSB 1MB cache			
2/2/2004	$218**	214*	$215*
Intel Pentium 4 3.2GHz 800MHz FSB			
6/23/2003	$637**	269*	$275*
Intel Pentium 4 3.2GHz 800MHz FSB 1MB cache			
2/2/2004	$278**	$277*	$278
Intel Pentium 4 3.4GHz 800MHz FSB			
2/2/2004	$417**	$425*	$419*
Intel Pentium 4 Extreme Edition 3.2GHz 2MB cache 800MHz FSB			
11/3/2003	$925**	$830	$843
Intel Pentium 4 Extreme Edition 3.4GHz 2MB cache 800MHz FSB			
2/2/2004	$999**	$989	$989
Intel Pentium 4 520 2.8GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$178**	$178**	N/A
Intel Pentium 4 530 3GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$218**	$218**	N/A
Intel Pentium 4 540 3.2GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$278**	$278**	N/A
Intel Pentium 4 550 3.4GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$417**	$417**	N/A
Intel Pentium 4 560 3.6GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$637**	$637**	N/A

* Retail price

** Manufacturer's price per 1,000 units

Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

Dating Lessons With Anime Play?

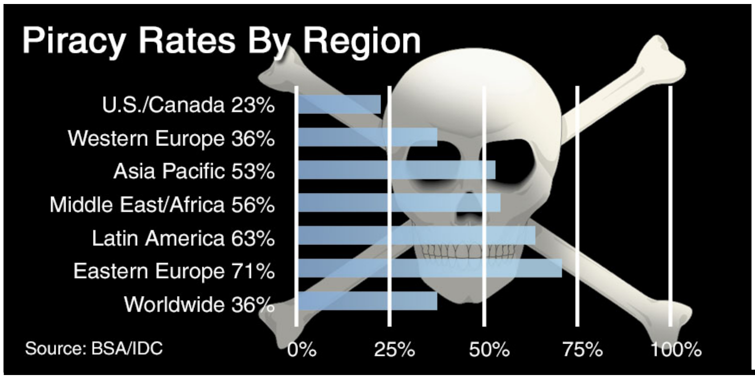
Nanaka : Ha! (chew)(chew) this is it Nanaka! Speed is life! Destroy! 2 at once! (gobble) (gobble)!
PLEASE SELECT A CHARACTER.
DOLLL
MANAMU
NEE

In DVD-based dating simulations, you interact with the anime story line to compel characters toward romance, not monster bashing.

A new flavor of entertainment software has hit American shores, combining Japanese anime film with interactive gameplay on a DVD format. Dubbed Anime Play by stateside distributors such as Hirameki International Group (www.hirameki-int.com), this DVD-based format is wildly popular in Japan and can run in a standalone DVD player or PC DVD drive. The film-like animation is punctuated by story line branches where you input key decisions for the main character and set them off on plot paths. Titles such as Tea Society Of A Witch (Hirameki) are known as dating simulations because the stories usually involve young characters whom the player guides toward a fuller relationship with another character. Unlike typical Western games, the goal in Japanese dating sims is to attain true love rather than defeat level bosses. The format has already spawned a magazine, *AnimePlay* (www.animeplay-mag.com), which packs a DVD along with its quarterly print product. Curious anime fans, and anyone seeking dating practice, can find Anime Play discs for sale at AkibaOtaku (www.akibaotaku.com) and Jast USA Games (www.jastusa.com). ▲

More Than 1/3 Of Software Is Pirated

Software piracy is so rife in some areas of the world that in countries such as Vietnam, China, and the Ukraine, less than 10% of installed programs are legitimate versions, according to a new study from the BSA (Business Software Alliance) and IDC (International Data Corp.). Worldwide, the BSA estimates that 36% of all installed software is pirated, but the rates vary greatly by region and country. The United States has the lowest piracy rate of any country (22%), with New Zealand (23%) and Denmark (26%) close behind. The BSA estimates that $29 billion was lost to piracy in 2003, while $51 billion was spent on legitimate copies. ▲

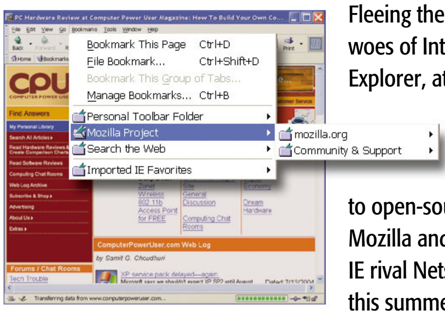

Piracy Rates By Region

Source: BSA/IDC

Software Shorts

A Chink In The IE Armor?

Microsoft's total dominance of the Web browser market suffered a hiccup this summer. According to metrics firm WebSideStory, IE's market share actually dropped a tick, from 95.7% of desktops in June to 94.73% in early July. A June advisory from the security monitoring group US-CERT (United States Computer Emergency Readiness Team) suggested that Web users look for an alternative to IE because of its ongoing security holes, and apparently a least a few of us did so. The still-lingering Netscape and Mozilla browsers benefited from Microsoft's small dip, as the combined market share of the two browsers went from 3.21% to 4.05%. ▲


PC Hardware Review at Computer Power User Magazine: How To Build Your Own Co...
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Manage Bookmarks... Ctrl+B
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Mozilla Project
Search the Web
Imported IE Favorites
mozilla.org
Community & Support
CPU
Find Answers
ComputerPowerUser.com Web Log
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Fleeing the security woes of Internet Explorer, at least a few Web users switched to open-source browser Mozilla and former IE rival Netscape this summer.

Cut-Rate Windows XP?

Microsoft may feel secure in Windows' desktop monopoly in the United States, but it is much more Linux-phobic elsewhere. In order to stem piracy and adoption of the competing OS, Microsoft is selling a Windows XP Starter Edition in Thailand, a localized version of Windows XP Home Edition that is stripped of some unspecified features and bundled with part of MS Office for a bargain price of $38 U.S. According to trade information site Microsoft Watch (www.microsoft-watch.com), a similar package launched in Malaysia recently, but there is no word whether Microsoft plans to sell the Starter Edition in other developing markets in what seems to be an emerging war with Linux. ▲

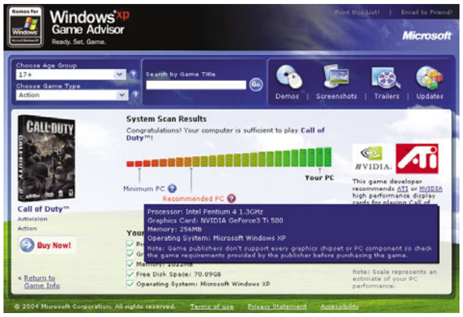
Let Me Be Your Father Figure

Aging heartthrob George Michael couldn't stand the heat in his own site's online forums, so he shut them down.

The Internet is no place for thin-skinned, fading celebrities. In what amounted to the most press exposure singer George Michael has received since his arrest in 1998, he announced he was shutting down the forums at his home site because of the criticism aimed at him by too many members. "I find it really sad to see the forums so packed full of negative comment, and that so many genuinely positive fans find themselves defending me (or themselves) constantly against attack. How pointless," Michael said in a final message to fans. Notes about Michael looking old and pudgy, along with users linking to illegal MP3 copies of the singer's songs, contributed to the decision, according to reports. He claims that he wishes "to stay away from the negativity of the media." To the crooner's credit, he did not pull the plug unceremoniously. He gave users fair warning of his decisions so that they had time to arrange with forum buddies to take the conversation elsewhere. ▲

Windows XP Game Advisor: Is Your PC Up To It?

Ever wonder whether your aging PC rig is really up to the task of running Unreal Tournament 2004 in the way God and NVIDIA intended or whether your notebook is going to be able to handle a session of Neverwinter Nights on the road? Microsoft just launched its Windows XP Game Advisor, an online buying guide and system tester that helps gamers identify the titles that are most compatible both with their tastes and their hardware. A library listing hundreds of retail PC titles from all publishers can be cross-indexed by five age groups and 11 gameplay genres. You can download screen shots, demos, and trailers to decide on a title. But this thing gets really cool when you ask the advisor whether your own PC can run the game. Using technology from 3DMark-maker FutureMark, the advisor scans a PC and its peripherals to place the rig on a scale indicating whether they meet or exceed the game's minimum and recommended requirements. If your PC registers way up on the scale, then you can be confident the game will run with most of its high-quality video and audio options turned way up. ▲



Choose Age Group: 17+

Choose Game Type: Action

System Scan Results

Congratulations! Your computer is sufficient to play Call of Duty™!

Call of Duty™
Activision
Action

This game developer recommends ATI or NVIDIA high performance display cards for playing Call of

Processor: Intel Pentium 4 1.3GHz
Graphics Card: NVIDIA GeForce3 Ti 500
Memory: 256MB
Operating System: Microsoft Windows XP

Note: Game publishers don't support every graphics chipset or PC component so check the game requirements provided by the publisher before purchasing the game.

✓ Memory: 1022MB
✓ Free Disk Space: 70.09GB
✓ Operating System: Microsoft Windows XP

Note: Scale represents an estimate of your PC performance.

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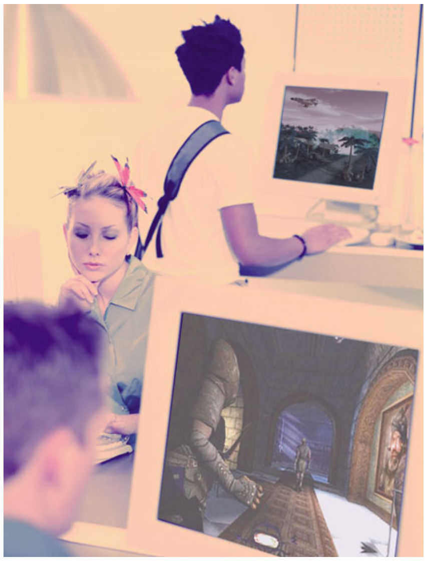
The Windows XP Game Advisor can tell you on the fly whether your PC really measures up to playing Call Of Duty in all its bloody glory.

Cyber Cafes Get Chaperoned

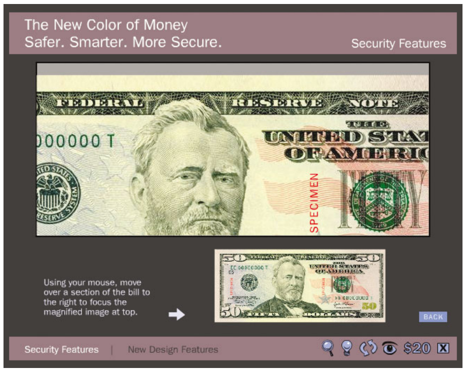
Don't be surprised if you get carded at your next nighttime visit to a Los Angeles cyber cafe. Claiming that these centers for connecting to the Internet and playing networked games have become troublesome, sometimes violent teen hangouts, the city now requires any cafe with more than five PCs connecting to the Web to obtain a license from police. All minors are banned from cyber cafes after 10 p.m. and during school days until 1:30 p.m. Local politicians began looking into the problem after a 2003 incident at one cafe where a multiplay game of Counter-Strike escalated into a brawl. According to a later investigation by the city council, 86% of arrests at cyber cafes involved minors, and 93% of arrests were for truancy or breaking local curfews. Nearby Orange County, Calif., had cracked down on its cyber cafes after numerous violent incidents in 2002 and the deaths of two minors. Whatever happened to the days when the Web was identified only with pasty-faced dweebs whose closest encounter with a brawl was an imaginary lightsaber duel with the pet dog in their bedroom? ▲



Los Angeles is trying to cut off criminal behavior at local cyber cafes by banning minors during the late hours on school nights and school hours.

Money Gets Interactive

Don't play with that money; you don't know where it's been. Now there is a way to fondle your cash and still keep Mom happy, courtesy of the U.S. BEP (Bureau of Engraving and Printing; www.moneyfactory.com). The BEP recently put up interactive currency, Flash presentations of the newer, more counterfeit-resistant $20 and $50 bills. You can magnify the currency while you scan, pan, and flip the bill. A walk-through highlights all the new security features such as color-shifting ink and a security thread. Our favorite toy, however, is the back light button, which reveals all of the hidden watermarks and the front and back of the bill at once. While you are at the cleverly named MoneyFactory.com, don't forget to hit the online store where you can actually buy money. No joke. The BEP sells uncut sheets of $1, $2, $5, $10, and $20 bills, the same format that comes off its printing press. A sheet of 16 $20s shipped in a tube will cost you $409. Now you can wallpaper your bathroom . . . for a couple hundred thousand bucks. ▲



Using your mouse, move over a section of the bill to the right to focus the magnified image at top.

The U.S. Bureau of Printing and Engraving has turned the new $20 and $50 bills into point-and-click museum displays.

New On The 'Net

Webcomics Examiner Nurtures A New Art Form

Animated Webisodic series and online digital comics finally get a critical journal of their own. The Webcomics Examiner (webcomicsreview.com) reviews the latest and best of Web-only graphic narratives. These little gems are hard enough to find, but reading the WE in its first two months has already made us fans of great Web-only epics such as "Outside the Box" and Webcomic repositories such as ModernTales.com. If you want a thoughtful guide to watching a fledgling art form take shape, this is the place to be. ▲

THANKS, I LIKE TO THINK I'M A HANDY GUY.
YOU MAKE ME SICK.
YOU'RE WEAK AND INSIGNIFICANT. WHO ARE YOU TO BE DIFFERENT? TO BE CAPABLE? TO DRIVE YOUR OWN DESTINY?

Sci-Fi Gets Its Hall Of Fame

Microsoft co-founder Paul G. Allen helped fund the newly opened Science Fiction Museum and Hall of Fame in Seattle (www.sfhomeworld.org), and the accompanying Web site puts exhibits online and includes biographies of all 36 charter Hall of Fame members, among them Isaac Asimov and Jules Verne. But you won't want to miss the slideshows of great sci-fi artifacts including Buck Rogers' ray gun and, of course, Captain Kirk's chair from the U.S.S. Enterprise. Beam us over! ▲

Pest Central

The Center for Pest Research (research.pestpatrol.com) is a spyware hunter's resource provided by, of course, anti-spyware provider PestPatrol. Despite the self-serving pitches for its own product, the site has a wealth of news, tips, and lists pertaining to spyware, how to remove some offenders, and how to block further invasions. While we would like to see PestPatrol invest time to keep the Center's news and links more up-to-date, it is a great starting point for those whose PC borders have been compromised by unwelcome agents. ▲

BIOS Upgrades Available Online

Compiled by Kevin Savetz

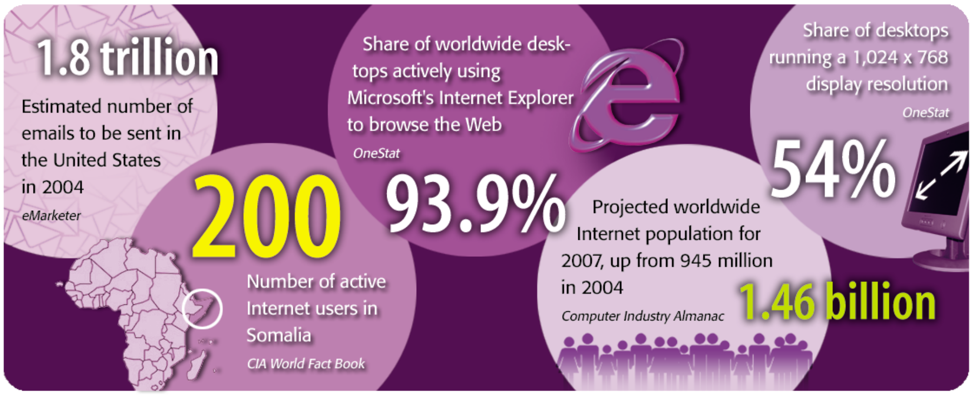
Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpusep04/bios to see our entire upgrade list.

Motherboard	Date Available	URL
ABIT SG-72	07/02/2004	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=163
AOpen AK79D-400VN	07/14/2004	download.aopen.com.tw/downloads/userdownload_List.asp?RecNo=8226&Model=AK79D-400VN
AOpen AK77-600GN	07/14/2004	download.aopen.com.tw/downloads/userdownload_List.asp?RecNo=8229&Model=AK77-600GN
Chaintech 7KDD	06/25/2004	www.chaintechusa.com/tw/eng/Download/dl_desc.asp?DCSNo=4&PISNo=19
EPoX 4PLMI	06/30/2004	www.epox.nl/english/support/bios/pentium4.htm
Gigabyte GA-K8NS Pro	07/06/2004	tw.giga-byte.com/Motherboard/Support/BIOS/BIOS_GA-K8NS%20Pro.htm

Compiled by Steve Smith

If you read *CPU*'s "Not Just A Flash In The Pan" (see the August 2004 issue, page 80) on innovative Flash programming, you know that Macromedia's popular tool is behind some of the most creative Web sites and interactive creations online. If you have extensive experience with Flash and designing application interfaces, then you could help decide this programming tool's future as its Senior Product Designer. You would "significantly influence product strategy" by representing the user to the Flash design team and supervising interface design. Everything from new program icons and skins to incorporating customer feedback and dreaming up new interfaces, your job is to make one of the most accessible programming tools around even more inviting and versatile. ▲

RAW DATA



1.8 trillion
Estimated number of emails to be sent in the United States in 2004
eMarketer

200
Number of active Internet users in Somalia
CIA World Fact Book

93.9%
Share of worldwide desktops actively using Microsoft's Internet Explorer to browse the Web
OneStat

1.46 billion
Projected worldwide Internet population for 2007, up from 945 million in 2004
Computer Industry Almanac

54%
Share of desktops running a 1,024 x 768 display resolution
OneStat

Cable Still King As Broadband Takes Over

Broadband is on the fast track in the United States, with 42% growth in high-speed connections in 2003 alone, reports the FCC, and that is good news for the entire Web economy. More than 28 million high-speed access lines are in service in the United States. With providers such as SBC and Verizon pushing their technologies hard among consumers, DSL got a 47% boost in its customer base last year, barely edging out the 45% growth in cable modem connections. Nevertheless, cable still powers 13.7 million small businesses and homes, compared to 9.5 million DSL lines. Among higher-speed connections (200Kbps), however, cable grew an astonishing 84% in 2003 vs. DSL's 39%. According to most studies, high-speed users spend more time and money online, so higher broadband penetration improves prospects for ecommerce revenues, online ad spending, and fee-based downloadable content such as on-demand movies and music.

Rank	ISP	Connection Types	Subscribers (in millions)	Market Share
1	America Online	Dial-up, broadband	24	26.1%
2	Comcast	Cable	~5.7	6.2%
3	United Online (NetZero/Juno)	Dial-up	5.4	5.9%
4	EarthLink	All types	5.3	5.8%
5	SBC	DSL	4.0	4.3%
6	Road Runner	Cable	3.4	3.7%
7	Verizon	DSL	2.7	2.9%
8	Cox	Cable	~2.1	2.3%
9	Charter	Cable, dial-up	1.7	1.8%
10	BellSouth	DSL	1.6	1.8%

Top U.S. ISPs

How do people get online in the United States? According to ISP Planet's (www.isp-planet.com) tally of subscribers and market share in Q1 2004, AOL still rules with massive numbers of dial-up customers and a growing broadband clientele, but the cable and DSL providers are quickly gaining.

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- Brushed All-Aluminum Case / 431W Enermax
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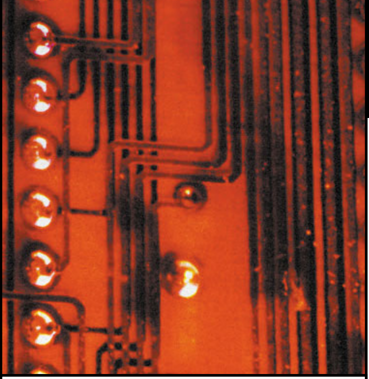
HYPERSONIC

The Saint

by Alex St. John

Building A Quantum Computer



Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

Last month I described the theoretical power of quantum computers. This month we're going to explore a simple example of how a quantum computer might be built. Interestingly there are many quantum materials that may be used to assemble a quantum computer. Just about any quantum particle that supports two discrete quantum states will do. A single electron may be a good place to start. Electrons can exist in any of two quantum states, spin-up or spin-down. You can imagine them as little spherical tops spinning in either of two directions. The classical physics analogy breaks down rapidly from here, however, because an electron can actually exist in both a spin-up and spin-down state simultaneously until you "observe" it. The ability to exist in a combination of two states simultaneously (superposition) is what gives an electron its quantum computing potential.

> **Imagine a dark room filled with eggs suspended by thread.**

Physicists like to enhance the mysteriousness of quantum physics by pretending that there is something magical about observing quantum objects. The act of observing quantum objects changes them. What you have to realize is that at the quantum level, there aren't smaller tools to analyze the smallest known objects with. Imagine a dark room filled with eggs suspended by thread. To observe the contents of the room on a classical scale, you might shine a flashlight into the room and observe the suspended eggs without apparently altering them. At the quantum level, pointing a flashlight into a dark room is like hurling a bowling ball into it and observing the mess on the ball when it rolls out. Light or radio waves (same stuff to physicists) have a dramatic impact on quantum objects; light or electromagnetism is the tool we use to program our quantum computer.

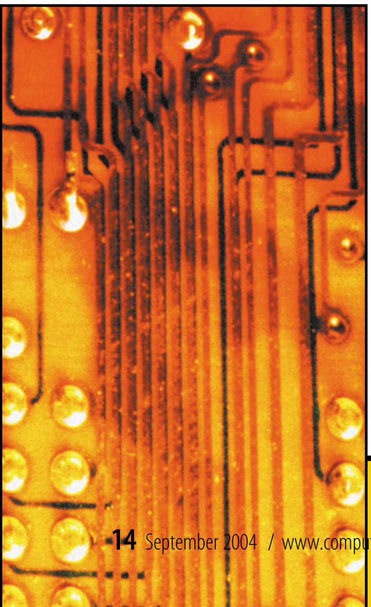
Because quantum computers are extremely fragile, they must be isolated from any errant energy in the environment that might disrupt their carefully structured state. Random radiation has the same effect on a quantum computer as waving a magnet over your hard drive does, erasure. It is important at this point to illustrate the difference between a quantum computer and a nanocomputer. A nanocomputer is a classical computer that may rely on quantum states to carry out classical computations. For example, an electron can be placed in a known spin-up or spin-down state. We can use this property to create a classical computer treating each electron as a simple classical bit that represents a 1 or 0 computationally. To make this arrangement a quantum computer, we need to put the electron in a superposition state, which is a combination of both spin-up and spin-down states.

How you would use a quantum bit or qubit to carry out an interesting new kind of calculation may not be apparent until you understand another important property of quantum computing. Entanglement is a property of quantum objects that gives them their exotic computing potential. To grossly summarize the phenomena, entanglement is the ability to trick two seemingly separate and independent quantum objects, electrons in this example, into thinking they are linked to one another, such that when one object is changed, the other changes, as well, even though the two objects appear to be completely separated in space with no physical connection between them.

Here's where some of the infinite potential for carrying out certain kinds of computations appear. When two qubits are entangled and one is radiated to read or write information to it, the entangled qubit reacts instantly as though it were directly linked to its entangled partner. It has this "instant" reaction, even if it's located on the opposite side of the galaxy from its entangled partner. It is when we are storing information and computing with these entangled superposition states of an electron that the computational magic of a quantum computer pops out and we suddenly have the ability to carry out computations no classical computer is capable of.

Now we have the tools to build our own quantum computer. Collect a bunch of electrons, trap them in space, isolate them from random energy interference, and use electromagnetism to entangle them, program them with data, direct computations, and read the results. What could be simpler? ■

Jump space and time by emailing TheSaint@cpumag.com.



Dream Hardware

This summer sizzles with sights, sounds, and super-sized storage. Seagate stocks your silver screen server with a semi-terabyte, supplying surplus space and smooth streaming. Simultaneously, SeeReal showers your senses with stereoscopic splendor. Sadly short of sibilants is Go-L's Athens. Starstruck? Start saving some silver.

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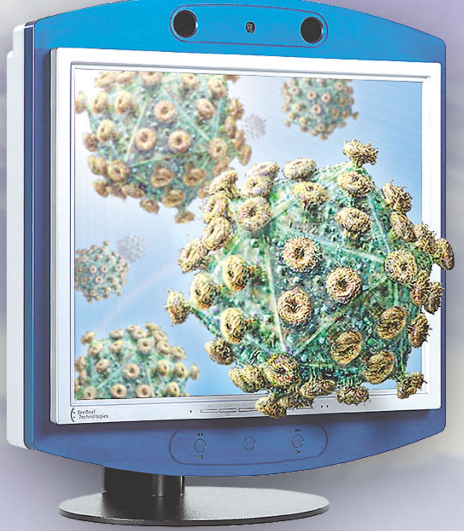
by Marty Sems

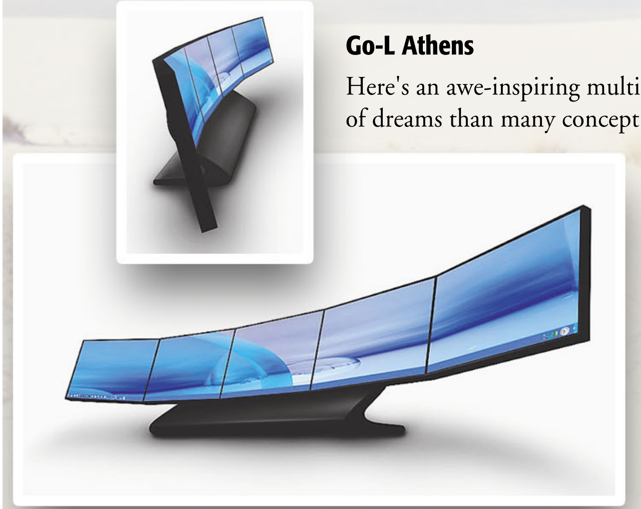


SeeReal Technologies C-s

From Ben Affleck reverse engineering somebody else's work in "Paycheck" to Tom Cruise turning his home movies into Merry Prankster trips in "Minority Report," Hollywood wants to wow you with imaginary 3D computer monitors. For the state of the art in the real world, though, you have to peer around the globe at Dresden, Germany. SeeReal Technologies' 18-inch 1,280 x 1,024 C-s monitor (about $15,100; www.seereal.com; available at www.ampronix.com) avoids a pitfall of other 3D displays by letting the user position her head wherever she likes. The C-s tracks an infrared sensor "spot" the user wears and adjusts its stereoscopic image accordingly, so the display looks 3D from any reasonable angle. The similar C-i (about $12,100) monitor visually tracks the user's eyes without a wearable sensor, although it can't do so in a dark room like the C-s. Finally, the 20-inch 1,600 x 1,200 C-nt ($4,000) skips eye tracking altogether but has a wide 3D head position sweet spot—and none too soon for editor Samit's "Spacehunter," "Metalstorm," and "Spy Kids 3-D" film festival.

Seagate NL35 Series 500GB

After a few years' halftime, the hard drive capacity game has resumed. Hitachi scored first with its 400GB ringer, the 7K400. But now Seagate storms the floor and tramples a few cheerleaders with the first 500GB drive coming in Q4. That's half a terabyte, or about 25,000 trees worth of paper data, the company avers. Intended for nearline storage, the as-yet-photographed 2Gbps Fibre Channel NL35 will branch out into SATA next year. Details are sketchy, but Seagate claims sub-9ms seek times and 65MBps sustained read rates. Want more? The company also announced a 5GB, 1-inch drive; the 147GB 15,000rpm Cheetah 15K.4 (shown); a 100GB 7,200rpm notebook drive; and sundry 400GB and 300GB drives to fill the bench (www.seagate.com). Game on.



Go-L Athens

Here's an awe-inspiring multimonitor setup that's no further into the realm of dreams than many concept devices we've presented here. Under a new partnership with Fujitsu, Go-L's new Athens display comprises five 40-inch 1,280 x 768 TFT displays in its 200-inch form ($79,999; www.go-l.com). That's a total of 6,400 x 768 pixels with a 15ms response time and an 800:1 contrast ratio. For vastly more detail in a still-huge 110-inch format, look to the Athens 110-inch HR. This $89,999 penta-beast uses 22-inch 14ms TFTs to reach a stunning 19,200 x 2,400 overall resolution. Forum junkies will remember Go-L's name from the Great Flame Wars of '03-'04, in which the hyperbolically charged company stood accused of being a hoax, an Apple wannabe, and/or a might optimistic about its system specs. Even today, Go-L equipment isn't exactly commonplace. We look forward to seeing our first review unit, complete with unique inlay logo.

What's It Going To Be?

GeForce 6800 Ultra & Radeon X800 XT Card Roundup

NVIDIA and ATI have both rolled up their sleeves in terms of technology with the NV40 and R420 chipsets, respectively. The decision to choose one over the other is particularly difficult, with both technologies serving up similar performance, give or take a few frames per second. It has also taken awhile for actual products to filter into the market. Over the past month, we've seen a few GeForce 6800 Ultra and Radeon X800 XT boards trickle in from various OEMs.

It has been a slow haul, and perhaps with the advent of PCI Express and/or chip shortages for both NVIDIA and ATI, neither GPU has exactly been taking the market by storm. Look on any PC retailer's shelf and it's still chockablock full of Radeon 9800 XT- and GeForce FX 5950-based boards. Burning money is the order of the day, with the prices ranging from $399 to $499 here, so value and bang-for-your-buck end users need not apply. This is the Gucci and Armani of graphics cards.

GeForce 6800 Ultra-Based Cards

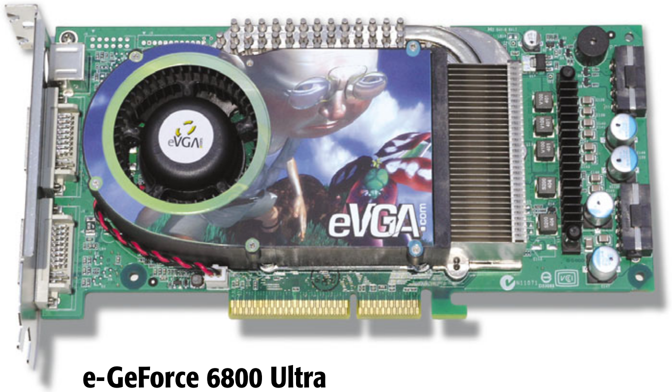
eVGA e-GeForce 6800 Ultra

First up is eVGA's e-GeForce 6800 Ultra. eVGA has been selling NVIDIA-only boards for three generations now, and despite a slightly shaky start with its heatpipe-HSF design a couple of years ago, it is back on track. The GPU that's used is actually a 6800 Ultra, which is mated on to a reference design board. The cooling solution is NVIDIA's stock one with an eVGA decal to distinguish it. The initial clock speed on my reference board was 435MHz for the GPU, but the final shipping speed may end up being slightly lower. The memory was set to NVIDIA's specified 550MHz. In case you haven't yet bought Far Cry, it comes bundled with the card. A very smart move indeed, seeing as this is pretty much the defacto showcase title for next-generation PC games.

An Extreme Edition of the board, clocked at 450MHz and 600MHz, respectively, will become available in very limited quantities by the time you read this. Online pricing research came back with a $499 to $550 price tag. If you already own a previous-generation eVGA card, the company will reward your loyalty with an upgrade program and discount you with its Step Up program. Nicely done, indeed.

PNY Verto 6800 Ultra

The second NV40 to grace my labs is PNY's Verto 6800 Ultra, which continues the company's long-standing relationship with NVIDIA. PNY is well-known for its memory solutions, but its loyal standing with NVIDIA has usually meant that being first to market with new GPUs is a priority. But being first also means having to push product out of the door with minimal fuss and tweaking. So if ever a 6800 Ultra could be referred to as "plain vanilla," this would be the board.



e-GeForce 6800 Ultra
$499 to $550
eVGA
www.evga.com
CPU CPU CPU CPU

The clock speeds on my board were set to 425MHz for the GPU and 550MHz for the memory, although with some overclock dabbling I was able to go a good bit higher. The Verto 6800 Ultra is based on NVIDIA's reference design with only a PNY Verto-branded badge covering the stock heatsink and fan combo. There's nothing wrong with being vanilla, as the Verto 6800 package is free of last year's unwanted game CDs (based on older generations of APIs) that are leftovers from some OEM deal and hence keep down the price. Why bother paying an extra $50 or so for the "value added" (I use this term loosely) bundles when you are really buying this type of card to play such games as Doom 3, Half-Life 2, S:T:A:L:K:E:R, and/or Far Cry? The only CD present is a "driver" CD along with a short instruction manual (and the necessary cabling).

If you insist on having freebies with your graphics card and are a beach/picnic type, there's a custom silk-screened beach cooler bag in the box, but because we gamers never see much of the sun, chances are we won't be putting it to much use, now will we? PNY's aim was

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Verto 6800 Ultra
$479 to $549
PNY
www.pny.com

to be first to market with an NV40 Ultra product and as usual be competitively priced in the process. I found the prices for the Verto 6800 Ultra between $479 and $549, which makes it the "value" board of this lot, if you will.

BFG Tech GeForce 6800 Ultra

BFG Tech is a relatively new U.S.-based company that sells NVIDIA-based products exclusively; hence its loyalty has been rewarded by also being to market before other big names. All BFG boards come with a lifetime warranty and full 24/7 tech support, the latter of which is rare in this industry. This might make that $499 price tag easier to swallow.

The version I got came clocked at an NVIDIA-recommended 425MHz and 550MHz. Although BFG also offers a more "extreme" version called the 6800 Ultra OC with its water block-cooling solution, this 6800 Ultra is a bog-standard reference design with the company logo embossed over the HSF.

Other than the board itself, there's a driver CD, two sets of cables (a nice touch), and a CD with three demos. Those of you into overclocking might seriously consider hanging on for the faster OC version, which should be an overclocker's dream. For an extra $99, the card is guaranteed to run 70MHz faster than stock. There are no VIVO options, so if that's something that's important to you, aside from gaming, you might want to look elsewhere. Otherwise, BFG has done another fine job. Its loyal online following should receive this latest product with open arms.

X800 XT-Based Cards

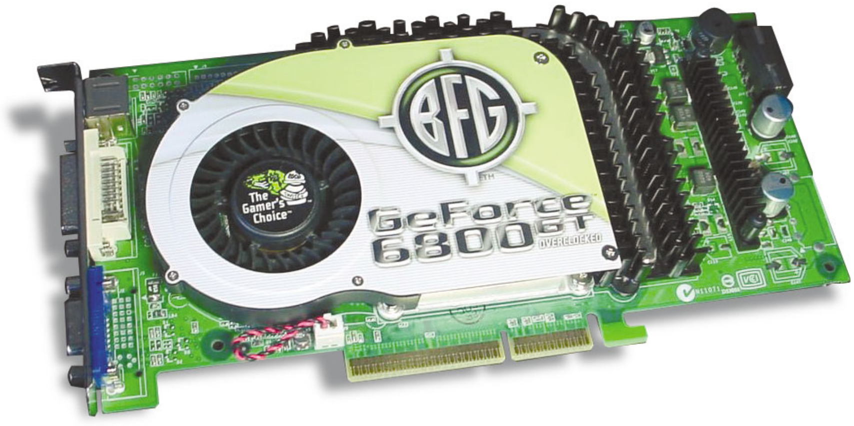
ATI Radeon X800XT Platinum Edition

ATI not only develops technology, but it also has a division that takes its GPUs and offers consumer boards. Obviously it is first to market and does not deviate from its own reference design. There's very little to distinguish this card from VisionTek's offering because the clock speeds are identical. If you already have Far Cry, then the original ATI board could be the better/safer choice, but for those not yet bitten by the Far Cry bug, the VisionTek makes more sense in the short-term. The pricing seems to be stuck at $499. And that Half-Life 2 coupon? We may yet cash it in this year.

VisionTek X800 XT Platinum Edition

VisionTek switched from making NVIDIA-based products to ATI-based boards a couple of generations ago and hence, it comes as little surprise that it is one of the first to market with an X800 XT

GeForce 6800 Ultra
$499
BFG Tech
www.bfgtech.com

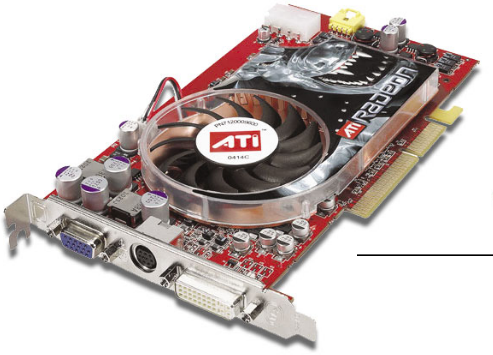


CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Platinum Edition board, called the XTASY X800 XT PE. Utilizing ATI's top-of-the-line R420 core, VisionTek has stuck with what the manufacturer recommended in terms of clock speeds. That means that my product was clocked at 520MHz for the GPU and 560MHz for memory.

There were no visible differences to ATI's reference design either, other than the VisionTek logo sticker placed over the fan. The backboard also came with the ATI Rage Theater chip, so all our favorite VIVO functions are fully supported. Amongst the batch of cables are some red, blue, and green ones allowing owners to output to an HDTV—very nifty, indeed.

X800 XT Platinum Edition
$450 to 499
VisionTek
www.visiontek.com
CPU CPU CPU CPU C



Radeon X800 XT Platinum Edition
$499
ATI
www.ati.com
CPU CPU CPU CPU

The bundle doesn't include any games, but it more than makes up for that fact by including a full version of EnTech Taiwan's PowerStrip overclocking and video card utility. This utility has been around for some time and is available online for a nominal fee, so having it included in a bundle makes a lot of sense. Once you install it, you'll wonder how you ever lived without it. (Extra brownie points to VisionTek for not slapping in Tomb Raider but instead including something useful in a bundle for a change.)

If you're basing your purchase on owning an SFF case, going with a single-slot design that doesn't require excessively high-powered PSUs makes any X800 XT board the viable option. Pricing ranged from $450 to $499, which makes it the "bargain" of the bunch, if you dare use that term.

In Sum

It's a very close call, and none of these boards would seem out of place in a high-end gaming system. One could argue that NV40 Ultra-based products are more future-proof with their support for Shader Model 3.0 and FP32. However, games today don't really take full advantage of those features. Throw into the mix the imminent shift to PCI Express and you could also say that AGP isn't exactly future-proof either. It's on the way out, but if you have to have the fastest available board today, the offerings from VisionTek and PNY are the two to get. Until we benchmark Doom 3 and Half-Life 2, it's hard to recommend one chip over the other in terms of performance, so NVIDIA and ATI are on a level playing field.

So, shop around for price and of course, make up your mind based upon the relative usefulness of extras, such as VIVO and HDTV if that's of interest. I came away with a wait-and-see approach, as there should be more OEMs coming out with boards shortly. ▲

by Alex "Sharky" Ross

GeForce 6800 Ultra & Radeon X800 XT Card Benchmarks

Five cards, five sets of benchmarks. Here's the lowdown.

	Far Cry v.13 1,600x1,200x 32; 4XAA, 8XAF	**AquaMark 3** 1,280x1,024x 32; 4XAA, 4XAF	**3DMark03** 1,600x1,200x 32; 4XAA, 8XAF	**Call of Duty** 1,600x1,200x 32; 4XAA, 8XAF	**Halo** 1,600x1,200x 32; No AA, NO AF
eVGA e-GeForce 6800 Ultra	53fps	56fps	4325	122fps	65fps
PNY Verto 6800 Ultra	54fps	57fps	4289	122fps	64fps
BFG Tech GeForce 6800 Ultra	54fps	56fps	4316	122fps	63fps
ATI Radeon X800 XT Platinum Edition	59fps	60fps	3992	107fps	66fps
VisionTek X800 XT Platinum Edition	58fps	61fps	4041	106fps	65fps

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

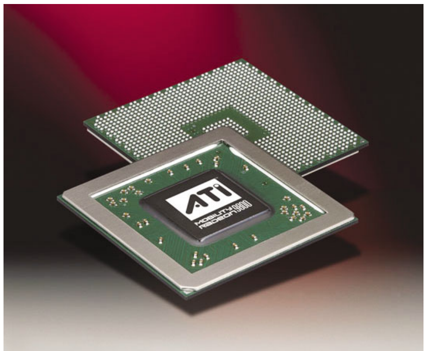
Mobility Radeon 9800

First Look
PREVIEW

You already have secondary PCs, perhaps for storage and productivity apps. The day is coming when you may also have secondary PCs for gaming, and my Magic 8 Ball says that at least one of these will be a notebook.

A new wave of Dell Inspiron XPS machines with ATI's new Mobility Radeon 9800 GPU (codename M18) will be out soon. Essentially, the MR9800 is an X800 with eight pixel pipelines vs. 16. Initial buzz says Dell may refer to this as "X800 SE." So you get four vertex pipes, the 3Dc mapping technology used in the desktop cards, all of ATI's latest shader innovations (1,536 instructions), DirectX 9 support, and the first-ever 256-bit memory interface in a mobile graphics chip.

Dell was unable to finish tweaking my test unit before press time, but ATI's internal benchmark numbers look stunning. In 3DMark03 (1,280 x 1,024 x 32), the MR9800 scores 4727 vs. the 2426 obtained by the MR9700. Throw in 4XAA and 8XAF, and the numbers become 2204 and 1082. Unreal Tournament 2003's Citadel botmatch (1,280 x 1,024 x 32; 4XAA; 8XAF) shows 52.8fps for the MR9800 and 31.8fps for the MR9700. The general trend is that MR9800 delivers 50% to 80% more.



Of course, the MR9800 isn't just for gamers. The chip uses fourth-generation POWERPLAY for extending battery life; supports multiple display output; and features OVERDRIVE, ATI's thermal-sensitive automatic overclocking tool.

Strangely, ATI has not released the MR9800's clock speeds as of this writing. Also odd is that ATI's Feb. 3 announcement noted the MR9800 "will be available exclusively on the Dell Inspiron XPS," and as of late July, there had been no change in this stance. Could it be that the platform is a little too bleeding-edge to trust to less-thorough OEMs? Or perhaps this is simply a way for ATI to let a handful of optimal chips keep the company's performance crown in the notebook space while mobile PCI-E parts are ramping up?

Thus I can't get too excited about MR9800 as a real-world product. But it does bode well for the success of PCI-E in notebooks and heralds the coming of true parity between notebooks and desktops. ▲

by William Van Winkle

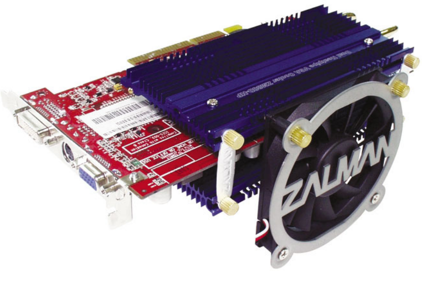
Zalman ZM80D-HP

ZM80D-HP
$39.95
Zalman USA
(714) 530-0700
www.zalmanusa.com

Fresh from enjoying other Zalman products, such as Reserator 1, I thought the ZM80D-HP cooler for graphics cards would follow suit. Without question, the blue aluminum heatsink plates and twin copper heatsinks are striking. Zalman also throws in enough front and back aluminum ramsinks for four chips, which is fine for ATI, but you'll need to buy another four for modern NVIDIA designs. The "optional" ZM-OP1 fan that lays across the top of the two heatsink plates is all but required if you're using a card at or above the Radeon 9800 PRO and FX 5800 levels. The ZM80D-HP is beautiful, but that fan destroys its elegance.

If this is your first VGA cooler installation, prepare to spend some time and make a mess. The manual has excellent diagrams but few tips. Also, I found the heatsink was incompatible with my NVIDIA 6800 GT reference card. (A revised model is supposed to correct this.)

Instead, I used ATI's X800 AGP 256MB. The card defaults to a memory speed of 445.5MHz and 472.5MHz in the engine. I used PowerStrip to bump these numbers to 501MHz and 531MHz, respectively. I looped the Mother Nature test in 3DMark03 at 1,280 x 1,024, 6XAA, 16XAF for 20 minutes to warm up the GPU under load.



To test Zalman's assertion that the ZM-OP1 fan was necessary, I tried running without it at default speeds. Sans the fan, my X800 idled at 45 degrees Fahrenheit and 70 F under load. With the fan, the numbers dropped to 37 F and 52 F, respectively—a huge difference.

However, given that ATI and NVIDIA have excellent, near-silent coolers out of the box, how much does Zalman deliver for $39.95 and an hour of setup time? Actually, a fair amount. Although idle temps for Zalman were only one degree less than the factory ATI cooler, Zalman kept the X800 10 degrees cooler under load at default speeds and 14 degrees cooler under load when overclocked.

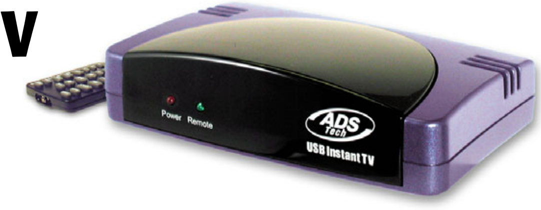
If you have a slightly older, OC-friendly card that doesn't require the ZM-OP1, then the ZM80D-HP is a winner. If not, then Zalman still delivers good cooling, but you lose the fanless appeal and gain an eyesore. ▲

by William Van Winkle

Specs: Weight: 350 grams; Heat dissipation surface area: 1,350cm^2; Dissipation material: anodized aluminum; Heatpipe: gold-plated copper tube

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

ADS Tech Instant TV



Instant TV
$129
ADS Tech
(800) 888-5244
www.adstech.com

You want to view and record TV shows (including HD programming) to your PC, and you want the rewind/pause/fast-forward benefits of time shifting. You're on a budget and don't want to pay TiVo or ReplayTV $13 a month for their programming guide, but you still want to schedule show recordings in advance and enjoy a remote control.

So far, a good bet might be ATI's TV Wonder VE with remote control ($79), but let's add that you're out of PCI slots or you want to quickly move your tuner/PVR from PC to PC. The best bang for your buck is probably ADS Tech's Instant TV.

Cosmetically dull, this package does a good job for its low price. I had my unit installed and recording in less than 20 minutes. The back of the tuner box features coax input, S-Video and composite output, 1/8-inch in and out audio jacks, and a USB 2.0 connection to the PC. The Instant TV is line powered, so you don't have a cumbersome AC brick. The software setup goes right through driver and Ulead's Video@Home 2.0 installation, but keep in mind that the package requires Windows XP SP1. As with most low-end tuners, guide programming comes courtesy of TitanTV.

I found the Instant TV's image quality decent at native resolution although a little grainier than higher quality tuners at, say, XGA resolution. The ability to manage, save, and burn recordings in MPEG-1/2, VCD, SVCD, and multiple DVD formats is a treat. My biggest complaint was that the Instant TV can be slow to respond, sometimes taking five or six seconds to initiate recording, and it can stutter during system multitasking. I was also confused to find that the 2X fast-forward caused frame jumping, but it didn't play any faster.

If the Instant TV were any more expensive, I'd hammer it for not including IR blaster support. But hey, for something you can find for $85 or so, this is one of the easiest ways to get into the PC-based PVR scene and be satisfied with the results. ▲

by William Van Winkle

Specs: Interface: USB 2.0; Output: MPEG-1/2, VCD, SVCD, DVD; Tuner: 125 analog channels; Ports: coax, S-Video, composite, 1/8-inch audio

Shuttle SB81P

SB81P
$399
Shuttle Computer
(626) 820-9000
us.shuttle.com

Nothing is perfect, but Shuttle's new 915G-based XPC with ICH6R southbridge comes close. It's bigger: 14.7 liters in volume vs. 11.1 for the G/G2 models. And the fascia is a chunky departure from the sleek G4. But such niggles pale beside Shuttle's interior redesign. The integrated card reader is now slimmed and stashed near the top. All drives install with toolless rails except the primary HDD, which snaps into the bottom of the drive cage. The optical drive mounts above this. The real "Ohmigod!" moment comes when you snap two additional railed SATA drives across the top of the chassis frame.

Shuttle's revamped ICE cooling system institutes lateral ventilation. The hot power circuitry is enclosed in a plastic chamber that opens to a vent on the right panel. An intake fan draws air through the CPU heatsink and past the ICE fins and water-filled heatpipes, and a second blower fan exhausts out the left panel. Two more exhaust fans sit atop the 350W 27dB SilentX power supply. Even with five fans the SB81P idles along with just a whisper.

To test performance, I rigged the XPC up with a 3.4GHz EE processor, 1GB of Corsair XMS memory, a 250GB SATA Deskstar, two preproduction Maxtor 250GB MaXLine III SATA drives in a RAID 0 configuration, and Windows XP SP1. In 3DMark03, with default settings, the SB81P's GMA 900 graphics card scored 1314, a major jump from the 700 to 800 scores I saw with ATI's 9100 IGP (albeit with a 3GHz P4C). AquaMark3 scores, however, were practically tied with ATI's IGP. More interesting is the benefit from using Intel's RAID technology. HD Tach averaged 49.8MBps on the C: drive and 55.2MBps on the RAID. PCMark04 shows an even wider spread, with 5424 on the C: drive and 7222 on the RAID.

The SB81P is quiet, stable, powerful, and surprisingly spacious, and I haven't even touched on the GbE support or incredible audio port selection. The overclocking is weak, but I dig the CMOS Clear button. All things considered, this is probably my favorite XPC yet. ▲

by William Van Winkle

Specs: LGA775 socket, 2GB max PC3200 DDR, Intel 915G/ICH6-R, HD Audio, Matrix RAID, GbE LAN, four SATA headers, one PATA header, one 5.25-inch bay, three 3.5-inch bays, four USB 2.0 and two FireWire ports

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

So whether you're installing utilities or updating print drivers for the umpteenth time, you can take your files with you wherever you go – and you won't even need your dolly.

For more information on SanDisk Cruzer Mini, visit www.sandisk.com/smart

HI-SPEED USB 2.0

SanDisk®

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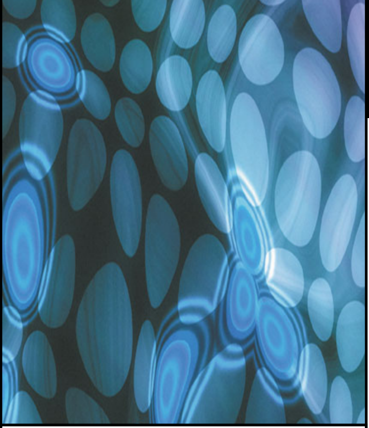
Anand's Corner

by Anand Lal Shimpi

Intel's New Pentium 4 . . . Again



Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' "48 Hours" and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

Intel's brand new chipsets have finally been launched and were met with relative disappointment. While the technology was interesting and exciting to look at, the performance, price, and the embarrassing recall immediately after its launch killed any excitement that existed. But when we've spent the past nine months hearing about these new technologies, features, and chipsets that were coming our way, what are we to do instead? Well, naturally, we start reading about what's coming next.

If you thought Intel was done with the chipset releases this year, you'd be quite mistaken. In Intel's usual style, this fall it will be releasing a revision to the 925X chipset called the 925XE which will add officially 1066MHz FSB support to the 925X feature set. With 1066MHz FSB support, the 925XE will be the official Intel platform of the brand new Prescott-2M.

> **If you thought Intel was done with the chipset releases this year, you'd be quite mistaken.**

The current Prescott-based Pentium 4s (the Pentium 4E) all run using an 800MHz FSB, which you should know is the rate at which the processor communicates with the "outside world" by means of your chipset. These Pentium 4s also have a 1MB L2 cache, double the size of the previous generation Pentium 4s. The new Prescott-2M, as the name implies, doubles the L2 cache size once again to 2MB while still sticking to the same 90nm process that all Prescotts are manufactured on. The larger cache should help cut down on the number of "bubbles" in Prescott's extremely long 31 stage pipeline, leading to better overall performance.

In addition to a much larger L2 cache, the new Prescott-2M will also feature a 1066MHz FSB—which will be enabled by the 925XE chipset I just mentioned. The benefit of a faster FSB really comes into play at higher CPU speeds, since the faster a CPU operates the quicker it needs data to crunch. The first Prescott-2M CPU will debut at 3.73GHz and should show a bit of a performance benefit thanks to the 1066MHz FSB.

The 1066MHz FSB will also sync up just wonderfully with the DDR2-533 memory bus of the 925XE chipset, offering 8.5GBps of bandwidth between the CPU and chipset North Bridge—the same as the amount of memory bandwidth offered by the 925XE's dual-channel DDR2-533 interface.

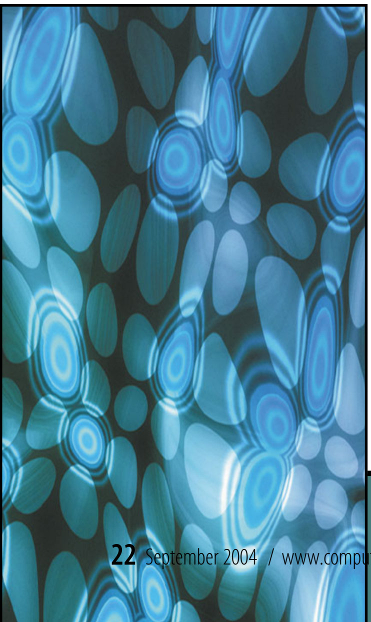
All Prescott-2M parts will fall under Intel's 7 series label, with the 3.73GHz part carrying the model number 720. This is a departure from all other Prescotts which are 5xx series parts. Even the upcoming 4GHz Prescott will be known by the 580 model number.

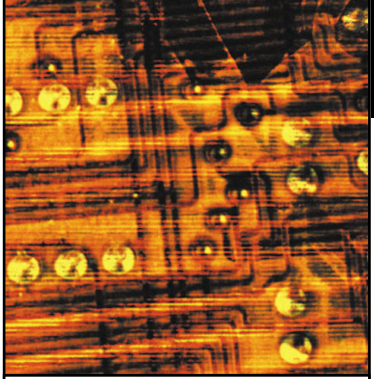
Intel expects the new Prescott-2M parts to replace the Extreme Edition in the desktop segment by the end of this year. It's tough to say whether Intel will bring back the Extreme Edition moniker to brand the new Prescott-2M based Pentium 4 7xx processors but currently it does not seem so.

Intel's reasoning behind the move away from the current Extreme Edition chips is simple to understand—not only does Intel's 90nm process make cramming a lot of transistors onto a chip easier, but Prescott also features Intel's most space-efficient cache (the highest density SRAM implemented in a desktop chip today). The older Extreme Edition chips are still 130nm parts that are much more costly to produce, and while it's unlikely that Intel will pass the majority of the cost savings onto the user (keeping the 7xx series processors nice 'n pricey), the move to 90nm Prescott-2M parts will allow for more flexibility in pricing should AMD happen to put more pressure on Intel from a price and/or performance standpoint.

For now, AMD still makes the chip to get and by the looks of Intel's roadmap it doesn't even seem like Intel's trying all that hard to take back the performance crown. Intel needs to exploit its clock speed advantage to win, and we'll see what happens when Q4 hits later this year. ■

Talk back to Anand@cpumag.com.

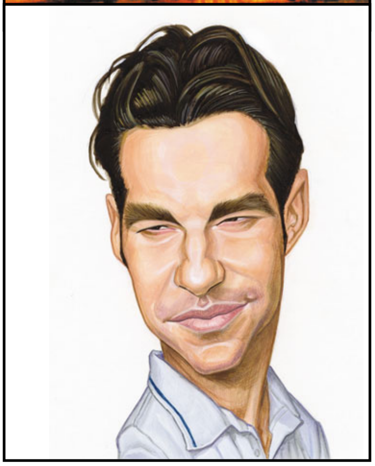




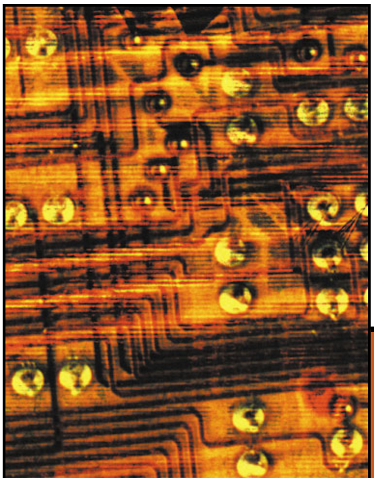
The Shark Tank

by Alex "Sharky" Ross

NVIDIA Gets SLI (Take 1)



Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.



Two heads are better than one they say, right? In the CPU world, real gear heads have always been drawn to multi-CPU systems and it's been the way to go for workstations. Back in 1998 when 3Dfx came out with its Voodoo2 board that could be "doubled" up as such via its SLI (scan-line interleave) technology, gamers were mighty thrilled to be able to get faster frame rates and higher resolutions. The dawn of AGP and other economical factors put SLI and other multiple graphics solutions to bed on the consumer side (though 3dfx spin-off Quantum 3D continues to build technology based upon multiple graphics boards).

The shift to PCI-Express for NV45 has opened the door once again for multiple GPUs and NVIDIA's SLI technology. Each PCI-Express-compatible NV45 will sport an output that can be plugged into a U-shaped bridge connector hooking up two boards for proper synchronization and transfer of image information. NVIDIA's SLI is short for Scalable Link Interface and not the same as the old scan-line interleave technique, but it does make sense from a marketing perspective to reintroduce multiple GPU technology with this old favorite. (NVIDIA inherited the SLI trademark when they acquired 3dfx.)

The shift to PCI-Express for NV45 has opened the door once again for multiple GPUs and NVIDIA's SLI technology.

One card is set up as the master, rendering the top half of the screen, and the second one is set up to render the bottom half. The amount of rendering done by each card is not limited to 50% each. Using NVIDIA's dynamic load balancing, the sharing can be optimized so that more complex scenes rendered by one card at the bottom of the screen where there are multiple objects, can be done by one card and less complex "sky"-type rendering can be done by the second card. Dynamic balancing of geometry and vertex processing and pixel shading makes more sense on workstations, but some day, when games become even more demanding, it could come in handy.

In order to use two NV45's in SLI mode, a motherboard with two PCI-Express x16 slots is required. You can scratch your head because currently there are no motherboards that provide two such slots. Then there's the fact that none of Intel's PCI-Express chipsets support more than 24 PCI-Express lanes so even prototype dual-PCI-Express 16 interface motherboards act as 1x16 and 1x8 lanes.

Today's 3D graphics cards are way more advanced and rarely get overpowered by the content available. There are only a few games, such as the outdoor scenes of Far Cry, where I can recall thinking that an NV40 or X800 XT is "slow."

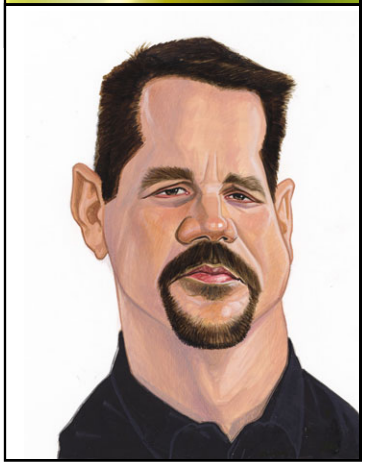
There are some restrictions however. You won't be able to mix and match different NV4x chips, even though you should be able to use cards from different OEMs (all NV4x cards sport the necessary connector). With six-month product cycles beginning to wane somewhat, being able to add a second card to your setup to virtually double the performance of your graphics could be a viable alternative to having to chuck out your previous generation card for a new one. At least you get the choice of using your existing 3D card.

Despite SLI being one of the more interesting briefings I've gotten lately, it's just that—a briefing at this point. I've got no testing or numbers to throw at you yet other than NVIDIA's claim of 1.87X the performance in 3DMark 2003 over a single NV45. NVIDIA's SLI technology is obviously far from being available to us gamers, but it'll trickle down eventually from the workstation and content development class of systems. It's good to know it can be done . . . even if by today's pricing, anyone interested will be about $1,000 out of pocket for the privilege. ■

Send your old Voodoo2 SLI cables to sharky@cpumag.com, and I'll send you mine.

by Kyle Bennett

NVIDIA Gets SLI (Take 2)



Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

Now I am sure many of you are thinking that NVIDIA getting sly with gamers is nothing new, but this time around NVIDIA is getting "S-L-I," not "S-L-Y." The company's new SLI is one of the most exciting things I've seen in the realm of video cards since the Radeon 9700 was released a couple of years ago.

For those of you not familiar with SLI, it has traditionally stood for scan-line interleave. Back in the days of the 3dfx Voodoo 2, you could use two 3D graphics accelerators in tandem, with one card drawing half the lines of resolution on the screen and the other video card picking up the rest of the lines. In simple terms this allowed up to double the frames rates, but even better it allowed me to see my first game at 1,024 x 768 resolution. I remember where I was standing in that Quake2 map the first time I saw it.

> . . . but I know that SLI has many of us rethinking our next video-card upgrade.

Now fast-forward several years to present day. NVIDIA has of course picked the SLI moniker to market its new technology because SLI simply screams performance with this product to so many in its target market. SLI now stands for Scalable Link Interface. NVIDIA's new form of SLI will actually use an algorithm that will split up the workload between the two video cards in a system instead of trading off lines of resolution.

The new form of SLI will be supported by NVIDIA's GeForce 6800 series of GPU, such as BFGTech's 6800 OC and 6800 Ultra. These cards will of course have to be PCI Express interface video cards, as AGP specifications don't support multiple AGP slots.

That said, not every motherboard will have the two X16 format PCI Express slots needed. And just because a motherboard supports PCI Express doesn't mean it can support SLI. As of writing this, there is very little information on the spectrum of motherboard chipsets that will arrive to fully support SLI. Currently, Intel's "Tumwater" and NVIDIA's nForce4 are the only chipsets to support SLI, and I have seen neither in the form of a retail desktop motherboard. Talking to folks in Taiwan, such as ABIT, you can be assured that both Intel and NVIDIA are getting support lined up.

So while NVIDIA has launched SLI, you can hardly go out and purchase it at this point. Hardly any PCI Express video cards are available, and no SLI-capable motherboards are for sale, but I know that SLI has many of us rethinking our next video-card upgrade.

As I mentioned here last month (August *CPU*, page 28), PCI Express video cards currently offer no real advantage over AGP cards, and I have verbalized more than once that gamers are certainly safe with purchasing another AGP card for gaming. But now if you are going to upgrade in the upcoming months, you might want to rethink your position and buy some equipment that would facilitate an easier upgrade into a future SLI system.

Still, it will be expensive to make the leap anytime soon in the direction of SLI. If you are going to include a SLI-capable GeForce 6800 PCI Express video card in your next upgrade, you're going to be required to buy a new i925X or i915 chipset motherboard, which will also require you to purchase a new Pentium 4 CPU and also new DDR2 memory.

The bottom line is that NVIDIA's new SLI technology will once again allow us to double up on video cards in our gaming boxes, should we want to, and we should be able to afford to do it. It isn't going to be quite as straightforward as it once was, and it will require some specialized hardware. But overall if you know more about it now, you can certainly ease your upgrade path in the future, should it be something you want to consider.

From what information NVIDIA has shared with me, it looks as though a new SLI setup could give increased frame rates by up to 90%. That of course is going to equate to NVIDIA GeForce 6800 cards giving some very impressive frame rates at high resolutions with lots of eye candy turned on in your favorite games. ■

You can talk with Kyle at kyle@cpumag.com.

IT'S SHOWTIME

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PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

Gigabyte 3D Cooler-Ultra GT

Intel's recent 925X platform debut was accompanied by a slew of new processors designed for the new LGA775 socket interface. Because the socket employs a locking mechanism, heatsinks no longer need to apply tons of pressure to the processor surface. Consequently, Intel's reference heatsink is a significant departure from the cooling hardware Socket 478 mobos used.

Unfortunately, it is also a bit bland. And it wields an exposed fan with sharp blades ready to hack into your fingers. Gigabyte's 3D Cooler-Ultra GT (about $55) is much more pleasant, built entirely of copper with heatpipes for efficient heat dissipation. The centrifugal blower isn't a health hazard, but Gigabyte does cover the top inlet with a plastic cover that features four blue LED lights. A PCI back panel fan-speed controller is included, enabling speeds between 2,000 and 4,500rpm.

The 3D Cooler-Ultra GT's most appealing feature may be its universality. Originally designed to work with Intel's Socket 478 P4 and AMD's Athlon XP/64 CPUs, the cooler and an optional retention mechanism add LGA775 support, as well.

Thermaltake Tsunami VA3000BWA Midtower

If you're a fan of Cooler Master's silver Wavemaster case, Thermaltake's new Tsunami ($140) should tickle your fancy. The aluminum chassis sports a similar front panel with a hinged door and blue backlighting LED lights. The panel actually opens in two pieces and shows off one of two bundled 120mm exhaust fans. A third 90mm cooling fan sucks air in from the case's clear side panel.

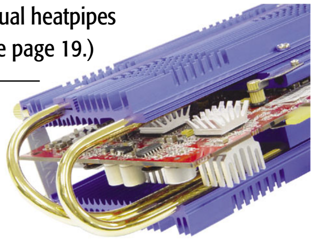
Beyond the black mirror finish and strategic front and back lighting, the Tsunami is highly functional. The side panel has an intrusion detector that you can lock. The front panel also has a lock. Installation is a cinch thanks to thumbscrews, screwless PCI slots, and sliding rails. Further, dust filters on the fans, a washable filter in the case, and an included cloth ensure the components won't be damaged over time.

The Tsunami only weighs 13 pounds, but it is loaded with features.

Zalman ZM80D-HP Passive VGA Cooler

Though sometimes unconventional in its designs, Zalman has a rep for cooling the hottest PC components silently or with minimal noise output. In fact, Sapphire uses the Zalman ZM80 VGA cooler ($35) on its Radeon 9800 Pro Ultimate Edition; it's cooled passively.

The cooler worked well in its original form, but Zalman improved it nonetheless. Bearing a similar name, the ZM80D-HP now comes with two heatpipes for more efficient thermal transfer and a set of memory heatsinks. The anodized aluminum cooler boasts more than 1.3-square meters of cooling area and weighs 350 grams. It's large and will occupy the PCI slot next to your AGP card.



Zalman's ZM80D-HP uses dual heatpipes for efficient dissipation. (See page 19.)

Fashionably Fresh Firmware

Apple AirPort Extreme

The 3.4.2 firmware for the AirPort Extreme 54Mbps base station reportedly enhances network reliability during certain memory-intensive operations.

www.apple.com/support/downloads/airportextremeupdate.html

Linksys BEFSR41 Cable/DSL Router

This firmware for versions 1 and 2 of the BEFSR41 fixes a number of issues, including a security vulnerability, and modifies a couple of the router's other functions.

www.linksys.com/download/firmware.asp?fwid=3

Handspring Treo 600

The v.1.13 update improves data connectivity and the way Web pages render on your Treo, enhances audio quality, adds echo cancelation for car use, and enables a privacy mode for incoming SMS messages.

www.palmone.com/us/support/downloads/treo600.html

Garmin GPS 152 Marine GPS Receiver

The 3.6 update corrects problems with Austrian moon-phase calculations and UPS grid conversions in zones B and C and changes some on-screen symbols.

www.garmin.com/support/download_details.jsp?id=151

by Chris Angelini

Building "Spike"

The Diary Of A Modder's Creation, Part III

In July's CPU *(page 31) we began following the progress of "Spike," a system that Gareth Powell is creating from scratch. In August's issue (page 31), Gareth began assembling Spike and placing hardware in the system. This month, he finishes up Spike in time for the opening of the Cyberathlete Professional League's opening ceremonies. Well, that was the plan at least.*

Every project has its twists and turns. This one has had more than its share. As I got closer to the end, though, I was confident the worst was over and the project would soon be complete. In retrospect, I couldn't have been further from the truth. As I stared down the barrel of a deadline, my confidence started to dwindle and doubt took its place.

Last month I left off with the frame complete and the hardware fitted to size. The side panels and spikes were the major elements needed to complete the project. The tools I needed to make the spikes weren't something I had readily available, so I handed the job off to someone who had access to them. This left me with shaping and forming the side panels. These panels frame the case and give it a splash of color. They aren't necessary to the case's structural integrity, but they finish off the look.

To make the panel, I had to start with a substance I could sculpt and form into the shape I desired. For this job foam was the best solution. I started with 2-inch-thick sheets of 4-pound urethane foam. I marked my cuts using a template I made from the frame I had already built. Using a keyhole saw, I carefully cut out the shape and got to work shaping it. I used the keyhole saw and a 200-grit sanding block to get the shape of the arch and smoothed it out so that I could start working on the curve.

The paint job on Spike's side panels turned out incredible. All it took was a one-of-a-kind custom paint mix and a whole lot of hours.

The 4-pound rigid foam was very light and cut like butter, but I had to be careful when working with it; if I dropped it on a hard surface, it would deform, and I'd have to have started over. Therefore, I took my time and began to carve the curve in the panel, but I first marked a line on the panel with a bit of string and a marker so I would know where the inner limit of the curve was. With a 200-grit sanding block, I started the slow task of forming the curve. When I made my Scarab system, I learned that patience is the key when hand-forming a compound curve, so I was prepared to spend several hours getting this right. After two hours, I had the curve formed. Now came the hard part of making another one that was identical.

I used the same technique when forming the second panel, breaking once in awhile to check that the angles matched the first one. This was a painstakingly slow process, but I found it relaxing. Before I knew it, four hours had passed, and the panel was nearly perfect. After a few minor adjustments, I had two matching panels that were ready for the next stage.

I used a stifling technique while fiberglassing the side panels. The fiberglass will give the panels strength and help with wear and tear.

The Fiber Of A Good System

Although the foam panels are rigid, they aren't strong enough to take much abuse. They needed to be strengthened to withstand the daily wear and tear they would be subjected to. Fiberglass is lightweight and strong, making it perfect for the task. I had a little glassing to do. Sanding resin is required for many fiberglass processes, but commonly it's used for making foam-core surfboards. My panels are constructed like a surfboard, so it was an obvious choice. Resin by itself is brittle, so it needs to be combined with fiberglass to give it strength. I used a 1-ounce fiberglass mesh with the resin so the panel would have the strength needed with minimal weight added.

The first step was to temper the surface. The foam is porous and wants to wick the resin inside; therefore, I had to first give the panels a liberal coating of resin before applying the glass. This way the foam wouldn't draw the resin away from the mesh, causing air bubbles to form and weakening the structure. The resin is a two-part process, sort of like an epoxy. You add a catalyst to the resin and mix it thoroughly. The catalyst (or hardener) creates a chemical reaction that causes the mixture to heat and harden. It's crucial to mix the catalyst right; too little and the resin won't harden, and too much and it hardens too quickly, making it crack and weaken. With the right ratio of catalyst to resin, you have about 20 minutes of working time. It takes about 30 minutes to harden enough before you can apply the next coat. Resin sticks to almost anything, so I used some waxed paper to cover the table. The waxed paper was slick enough that the resin wouldn't be able to bond well to the surface.

To get the arch of the panels just right, I used a sanding block to create the curve I wanted.

With the foam tempered, it was time to apply the fiberglass. I cut the mesh to size and fit it to the part while the temper coat was still a little tacky. This let it stay in place and not slide around too much while I applied the resin. Fiberglassing isn't that hard, but it takes a bit of practice. The best way to ensure there were no air bubbles and there was a good bond was to stifle the part with a brush. This forced the resin through the mesh and pushed the air out. If you have good adhesion, the mesh and the resin will be clear. (Air bubbles will show up as white.) You don't want any air bubbles at all, which is easier said than done.

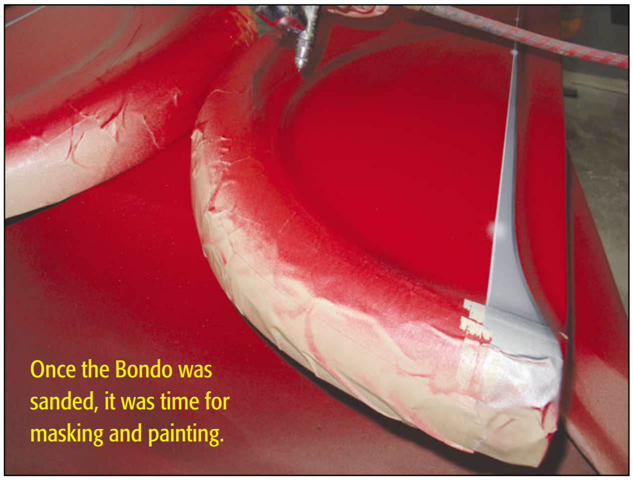
After the parts cured, I had to flip them over and apply the mesh to the back of the panels. I basically did the same thing as on the front and waited for it to cure so I could apply the second coat of fiberglass. Two coats of glass gave the parts more than enough strength, but I needed to sand these parts smooth, so I applied another coat of resin on top of the fiberglass to give myself a base to do my sanding. With the parts glassed, I gave them a good 12 hours to fully cure before starting to sand.

The Sandman Cometh

Fiberglass gave the unit strength, but it's almost impossible to get a smooth and level finish with it; therefore, sanding was necessary. I used 120-grit paper with a power sander to make short work of the task. The priority was to get all the excess resin removed and smooth out the finish so we could paint the parts. With some elbow grease, I soon had the parts smooth enough for painting.

In Part I of this diary, I expressed the desire to paint these parts with Boyd's Red. I thought it would be cool to have the parts painted at Boyd Coddington's shop because the color is named after him. That didn't pan out, though, so I took the parts to my favorite painter, Rick Primo of Primo Customs (www.primocustoms.com). Rick is a master of paint and airbrush techniques, and his work has been featured in many magazines, as well as on the TV show "Rides" where he took Christopher Titus' Ford Expedition and transformed it into a one-of-a-kind beast named "Killing The Soccer Mom." Rick is also featured on an upcoming episode of "Overhaulin'." Rick did the paint on Scarab, so I knew what he could do. He is also one of the few people who would let me hang around and help out with the work.

I did a decent job with getting the fiberglass smooth, but to knock out the high edges on the panels, I used Bondo before beginning the paint job.



Once the Bondo was sanded, it was time for masking and painting.

Although I did a decent job with flattening out the fiberglass finish, there were a few high spots and blemishes that would stick out like a sore thumb when the paint was applied, so we fixed those with a bit of Bondo and a lot of sanding. After several coats the finish was perfect and was ready for painting, which is also a slow process.

Like all good paint jobs, it starts with the primer. Rick sprayed the parts with a couple of thick coats, and after curing it was time to break out the sandpaper and get the finish as smooth as possible so we could apply the color. The color I wanted was a deep red. Rick talked me into spraying it with a custom mix he made specifically for this case. After he disappeared for a few minutes, he came back with the best-looking red I've ever seen. We dubbed it Primo Red. But we weren't finished.

I decided awhile back that I wanted to use a two-tone finish on Spike's curves. Also, the flat needed some depth, just a varying shade of red or a metal flake. This is where we decided to have a little fun. We made another one-of-a-kind paint, this time by accident. We took the red we had just made and added four or five pearl tints to create a unique-looking variation. Unfortunately, we didn't remember which pearl tints we used, so duplicating the color will be nearly impossible.

I masked off the areas I wanted to keep deep red, and the pearl was sprayed. After two coats it was hard to tell what it would look like because the pearl didn't really stand out until the clear coat was applied. In Part I of this diary, I wasn't sure what I wanted to do with the side panel accenting. I had come up with several concepts in the last few weeks, but none seemed to fit. I had planned on doing something in aluminum, but Rick and I came up with some accenting that would really set off the design. The concept was to mimic an aluminum strip close to the bottom of the panels by using some silver-metallic paint. Rick would then airbrush a beveled look on the paint and add some shadows. We then added shadows to the pearl-inlay design to make it stand out more. After removing the masking, we took a quick look at what we had before adding the clear coat. Four layers of the clear made this puppy look like a killer, but it had to cure awhile before we could finish up.

Polishing Spike

The next day the paint was cured, and it was time for color sanding. Color sanding gets rid of the little surface imperfections so Spike could be polished to a show-car shine. Using some sandpaper and water, I very lightly sanded the panels' surface slick to the touch. This is where Rick introduced me to an industry secret: the 3M Perfect-It III system. With this buffing-and-polishing system, we got a near-perfect finish that felt like glass.

The process started with an extra cut-rubbing compound. When used with a buffing pad, this removed the scratches left from the color-sanding phase. It also prepared the surface for the machine glaze. This step removed any swirl marks the rubbing compound left and brought the parts to a high-gloss shine. Next was the finishing glaze, which was applied with a ridged foam pad. The glaze brought out the show-car shine we were looking for, and the foam pad left a swirl-free finish that really gave the panels the look of glass. The paint job was almost done, but to really make a flawless finish, we used a micro-textured detailing cloth to remove any excess glaze before waxing the parts. The wax will give the paint some protection and a long-lasting shine. After a quick rinse, the parts were finally done.

It took a week to sculpt, fiberglass, Bondo, and paint the panels. The result was phenomenal-looking side panels. With the man-hours and custom-tinted paint involved, this process would cost well in excess of $1,000, so I don't intend on putting the parts in harm's way. The panels are the single most expensive part of this case so far, and after seeing the finished part, it was well worth the investment.

No matter how good the case looks, it doesn't matter unless it has some power to back up the beauty. This case, like all the competition pieces I build, does. The processor is a 3.2GHz Intel Pentium 4 Extreme Edition (not a bad way to start) that's coupled with a Shuttle XPC motherboard I amputated from an SB75G2 model. The board features Hyper-Threading support, dual-channel DDR

A $1,000 paint job in progress. I couldn't have been happier with the red we came up with.

After several coats of paint, it was time for some color sanding to get rid of the small imperfections. This involved some more sanding, buffing, and a finishing glaze.

400, AGP 8X, SATA, six-channel audio—everything I need with solid performance and a SFF. I have flip-flopped on memory on this project, considering different manufacturers and speeds, but finally I decided on Corsair Pro Series XMS 512MB modules. The XMS is among the industry's highest-rated modules, and with its built-in LED lights, I, like most case modders, can't resist RAM that lights up. For the drives, I went with a 120GB Maxtor SATA drive and a 40X Lite-on CD burner.

One of the major problems I had was finding a video card I wanted to use. I had my heart set on using an NVIDIA GeForce 6800 Ultra, but getting my hands on one wasn't panning out. This wasn't necessarily a bad thing because I had doubts the power supply I picked could handle it. The 6800 series cards require two separate, additional 12-volt rails to function at its highest performance level, so I would need to do some extra wiring in my already cramped case. With a case this small and so open, additional wiring would be difficult to hide. Thus, I gave up the hunt for a 6800-based card and opted for a Pine Technology's XFX GeForce 5900XT, which will still provide ample gaming power yet be smaller and require less power.

I'm Guilty

If I'm guilty of anything on this build, it's not appropriating my time right. When it came to the frame and the spikes, I thought I had given myself ample time, but the case's main feature has become the curse of the build. My first mistake was thinking I could do them myself. I spent about a week researching metal-forming techniques and eventually tried hammering out one by hand with a rubber mallet and a leather pad. It turned out to be a disaster. I decided to enlist the help of a friend, Chris Crouse, who works for one of the best sword and amour smiths around. Sword and The Stone in Burbank is legendary in the film industry; its work has been seen in more productions than I can list.

Working a couple of hours a night, Chris cut and shaped the 11 vertebrae to go along Spike's spine, carefully fitting them into place along the way. It took nearly a month to get the spikes done. Then one night the curse kicked in: A janitor assumed the vertebrae were scrap metal parts and threw them out. We were forced to start from scratch.

Our plan had been to construct the spikes of 0.090-zero-temper aluminum, first making a template for each of the 11 spikes and fitting them to the frame. We would then cut them with a foot shear. Once the rough shape was formed, the pieces would be shaped with a grinder and fit once more. The near-completed spikes would then be rolled to fit the contour of the frame. Each vertebra would be attached to the frame via two Allen machine screws, with the screws serving as a decorative finish and a security feature for the hardware inside. Essentially, each vertebra would have to be removed to get at the hardware inside. With the open-airflow architecture of this build, the components will be very visible. The security gives me peace of mind that someone will have to put in some work if he wants to get at the hardware.

I shared several different conceptual drawings with Chris for the spikes, including the original and revised versions. I stressed the importance of one spike being bent upward so that the case's solid rear piece could easily be removed. With the pressure of the deadline looming, I left him to his work.

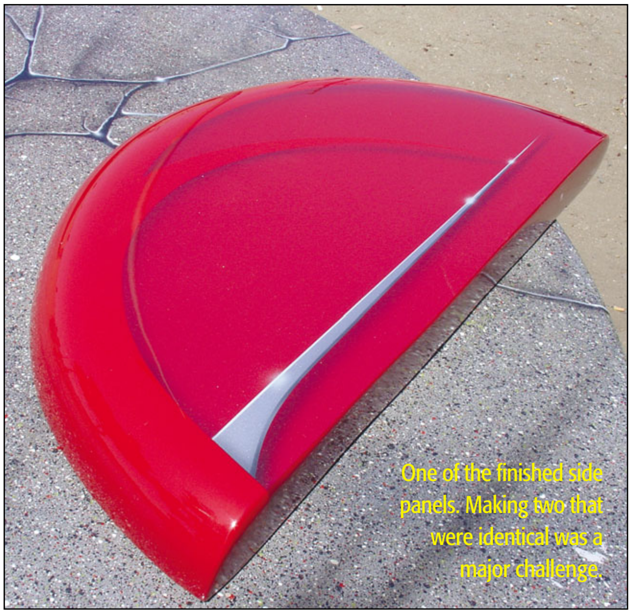
Somewhere in the process there was confusion about how the spikes should look, and that one bent spike was interpreted as being the design for every spike. Thus, every spike was bent upward, plus each spike was rounded as in the original concept drawing and not flush to each other like in the revised version. I realized I had confused Chris by showing him too many concepts, and he had done his best to incorporate features from all the concepts. Although I'm not happy with the end result, I can't blame him. If I had been more concise with expressing my desires, we would have been able to catch this earlier and avoided this.

I now have eight days to finish the case, and at this point I have to go back to the beginning. Moreover, Chris will be away on business for five of those days, so I must cut, shape, and fit the new spikes myself, which will be a challenge because metal forming is not my area of expertise.

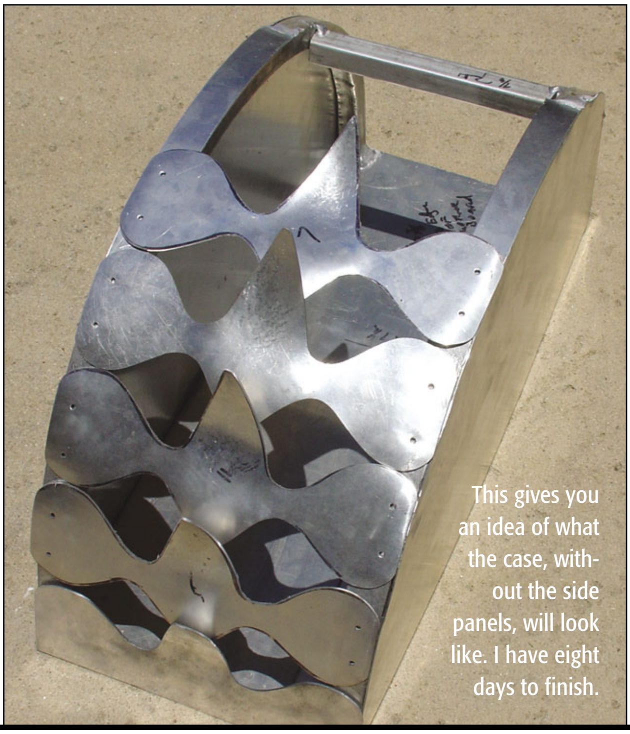
Still Work To Do

Once the spikes are done and in place, I still have work to do. I'll need to clean up the frame, plus TIG weld the aluminum siding in place. Additionally, the hand-bent frame will probably need a facelift. I'll also polish the entire system before putting it all together, which will involve fitting the side panels in place.

After that, I'll need to mount the components. The bottom vertebrae will need to be fitted to the CD-ROM drive, so I'll probably make a little spacer to span the gap between the drive tray and the spike. In addition, the PSU now fits very close to the drive's rear, so I may shorten and sheath all the wiring to minimize the visible wiring. I'll probably also rout the IDE and SATA cables, mount the LED and cold-cathode lighting, solder them into the power supply voltage, and clean up the wiring with some twist ties.


One of the finished side panels. Making two that were identical was a major challenge.

Creating the spikes for this case has been hell.


This gives you an idea of what the case, without the side panels, will look like. I have eight days to finish.

I'll also need to add a power switch. I like the paint job, so I don't want to set off the balance of the case by adding the switch assembly I had originally conceived. The plan now is to use a switch that matches the colors and case's style. I've never been a fan of button overkill; I like my designs to be the focus of the project, not the amount of buttons on the front. Because there are no case fans in this unit, it's pointless to have a fan controller stuck in it. So, one small button on the side to turn the unit on and off will be sufficient. In case you're wondering how the CD drive will open, it will be done through the OS. I also plan to rig a shunt on the vertebrae to press the eject button if needed. Finally, I'll need to install Windows—the official sign that a build is done. I'll probably take a few days to tweak the OS and adjust a few things.

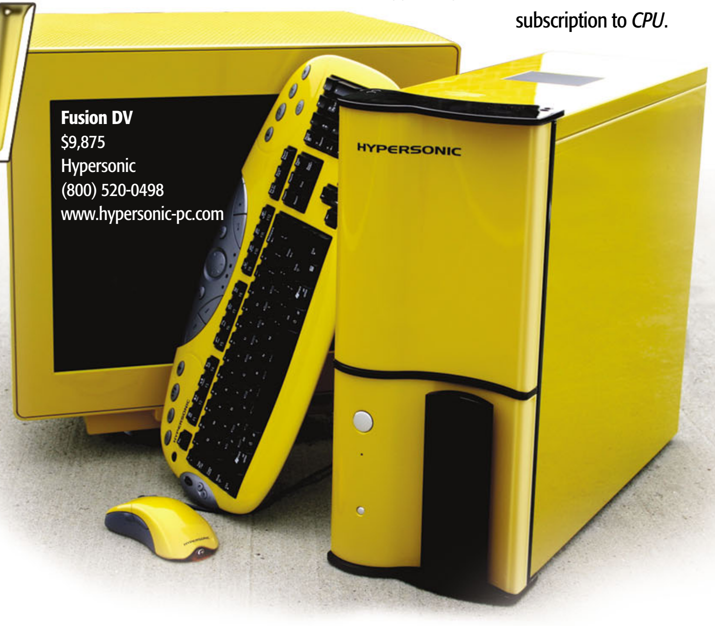
Looking back on the original design, I can say it's turning out quite well. Through all the stress and worry, it's been a good project, even though it hasn't gone as smoothly as I planned. This case is made for competition and display. As you read this, it will have been entered in the Cyberathlete Professional Leagues' C3 contest and been displayed at QuakeCon 2004. I mostly build cases for competition or clients; I rarely build them for myself, but this project was for me from the start. I doubt I'll make another like it or sell it. This is more than a computer; it's a chapter of my life that symbolizes the friendships and working relationships I've formed over the last four years. It also symbolizes a work of art, which is more valuable than any prize, title, or accolade.

Next month, you'll see the finished project, spikes and all. CPU

by Gareth Powell

Hypersonic Fusion DV

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you a $1,500 Newegg.com gift certificate and a one-year subscription to *CPU*.



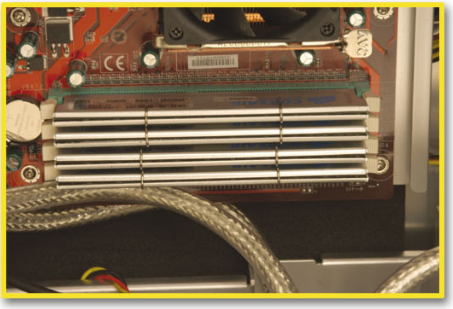
Fusion DV
$9,875
Hypersonic
(800) 520-0498
www.hypersonic-pc.com

Leave it to Hypersonic to build a digital-video workstation that's as powerful as it is stylish. As soon as we pulled the system from its heavy-duty packaging, the bright yellow tower and matching peripherals sucked in nearby staff members like moths to a flame. We've seen our share of unique windows, detailed paint jobs, and LED madness, but we admire the Hypersonic's straightforward approach to chassis beauty. The external features scream for attention, and they don't hide the system's insides by any means. You'll love Hypersonic's latest DV workstation for its looks, but you'll need it for its muscle. Welcome to the Fusion DV.

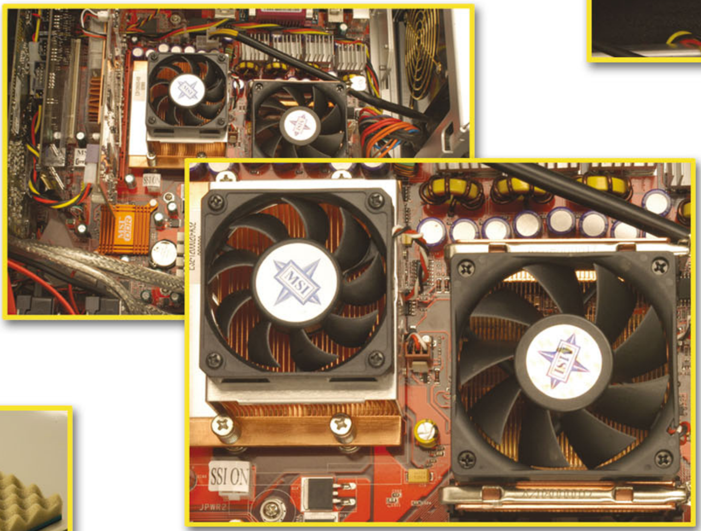
With the Fusion DV, Hypersonic juggled features to please the work hard-play hard types. The veteran system builder slapped dual 2.2GHz AMD Opteron 248 processors onto the socket-940 MSI K8T Master2 FAR mobo. The system boasts four 512MB PC3200 DIMMs and more than 500GB storage thanks to a RAID 0, 1 configuration that includes two 250GB hard drives (7,200rpm) and a 74GB 10,000rpm Western Digital Raptor. Hypersonic also added the ultrafast Plextor PX-712A DVD±RW. Instead of choosing a traditional graphics-editing video card, Hypersonic added the speedy 256MB ATI Radeon X800 Pro, which trounced our video benchmarks and brought DVDs to life. There is also a Matrox RT.X 100 Xtreme Pro Suite's video capture card.

For all its toys, the Fusion DV is a serious editing machine that carries an equally serious price tag: $9,875.

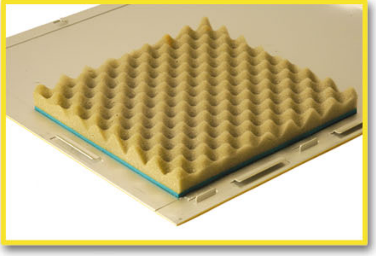
by Joshua Gulick



Memory: The system requires ECC memory thanks to the 940-pin Opteron CPUs. The motherboard's four sockets support up to 8GB of memory (four 2GB DIMMs).



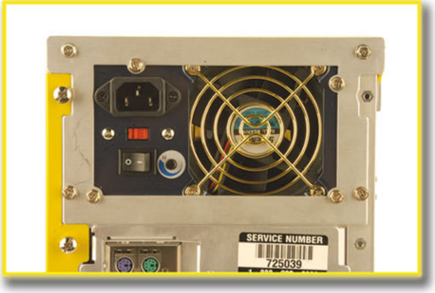
Dual procs: When it's time to crunch data, the Fusion DV flexes its two 940-pin Opteron 248 processors.



Foam padding: Hypersonic's Silencer Package includes special noise-insulation padding and low-noise chassis fans.

Monitor: If you're looking for screen real estate, you'll love the 22-inch NEC-Mitsubishi MultiSync monitor, which sports the same paint job as the tower.

Tower: Once Hypersonic applies the paint to the case, it adds a crystal coat. Next, it sands, buffs, and waxes your system. Do you treat your car this well? You might if your car had an X800 Pro in it.



PSU: A 550W Enermax PSU easily handles the dual-processor system.

Hypersonic DV Fusion Specifications	
Case	Sonicwave
Power Supply	550W Enermax EG651P-VE
Motherboard	MSI K8T Master2 FAR
Chipset	VIA K8T800, VT8237
CPU	2.2GHz AMD Opteron 248 (x2)
Heatsink/Fan Unit	Included with MSI Master2 FAR
RAM	512MB PC3200 DDR Corsair XMS LL Platinum ECC (x4)
Hard Drive	250GB Western Digital 7,200rpm SATA (x2); 74GB Western Digital Raptor 10,000rpm SATA RAID 0,1
DVD-ROM	Toshiba 16X DVD-ROM/48X CD-ROM
DVD+RW	Plextor PX-712A 12X DVD+R, 8X DVD-R, 4X DVD+RW, 4X DVD-RW, 16X DVD-ROM, 48X/24X/48X CD-RW
Media Card Reader	7-in-1 floppy drive/media reader
NIC/Modem	Integrated Gigabit
Video Card	256MB ATI Radeon X800 Pro
Sound Card	7.1 Creative Labs Sound Blaster Audigy 2 ZS Platinum
Speakers	500W 5.1 Logitech Z-680
Monitor	22-inch NEC-Mitsubishi MultiSync FP2141SB-BK
Keyboard	Logitech Elite
Mouse	Microsoft IntelliMouse Explorer 3.0
OS	Windows XP Pro
Price	$9,875
Extras	Hypersonic Silencer Package; Matrox RT.X 100 Xtreme Pro Suite; Reflexxion Series Limited Edition Spa Yellow Pearl and Sapphire Black Metallic paint job: tower, monitor, speakers, keyboard, and mouse

Fusion DV Benchmarks	
PCMark04 System	6362
3DMark2001 SE	23733
3DMark03	9597
AquaMark3	54586

Quake III	
800 x 600	329.65
1,024 x 768	328.5
1,280 x 1,024	322.1
1,600 x 1,200	298.4

Halo	
800 x 600	48.57
1,024 x 768	47.42
1,280 x 1,024	45.02
1,600 x 1,200	40.65

Speakers: Want to extend your Reflexxion Series Limited Edition Spa Yellow Pearl and Sapphire Black Metallic paint job to your peripherals? No problem. Hypersonic can paint this system for $800.

Red Face. White Knuckles. Blue Screen:

You spent hours building your system from the ground up and fine-tuning it to outsmart your opponents.

But how do you outsmart the blue screen of death?

Introducing Ballistix™, the high-performance memory line from the most trusted name in memory: Crucial. For those competitive enough to want the very best, and smart enough to know that stability matters!

With the Ballistix™ line, which features advanced speed grades, low latencies, and integrated aluminum heat spreaders, you can push the performance envelope without worrying about data loss or corruption, mysterious intermittent errors and display problems, or worse—the dreaded BSOD!*

Long-known for providing stable, high-quality, highly-acclaimed memory upgrades, the Ballistix™ line is backed by Crucial, the most trusted name in memory. Crucial's Ballistix™ memory brings peace of mind and lasting, worry-free performance to the bleeding-edge world of gaming and extreme computing—all wrapped up in our no-questions-asked-money-back guarantee!

Every Crucial Ballistix™ module comes with a custom-designed aluminum heat spreader, a dome decal case badge and sticker, Crucial's award-winning customer service and free technical support, and Crucial's limited lifetime warranty. And while other memory sellers might offer a cumbersome list of compatible processors and motherboards, Crucial provides the award-winning Memory Advisor™ tool, an easy-to-use, searchable memory database. In just three easy clicks, the Crucial Memory Advisor™ tool finds exactly the right Ballistix™ module for you—compatibility guaranteed.

So go ahead! Go Ballistix™!

To get more information about Ballistix™ including specifications, reviews, contests, and more visit:

www.crucial.com/gaming

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*Crucial® Ballistix™ products are tested to meet the published specifications on www.crucial.com/gaming. Some system configurations may not operate at the published Crucial® Ballistix™ memory speed and timing settings. Overclocking, running your system faster than published speed, or otherwise modifying your system timing may result in damage to computer components.

What Good Is Your Memory At 667MHz If It's Not Stable?

Memory is memory, right? Actually, no! Inferior memory modules can wreak havoc on your system. The blue screen of death, software crashes, driver and operating system hiccups—all can be caused by bad memory modules. And oftentimes, you don't even know it's the memory that's causing the problems. Do you really want to spend your precious computing time troubleshooting? Can you really afford to start from scratch?

As you increase the operating frequency of your FSB, the quality of the system components becomes increasingly important. When the FSB frequency increases, the allowable margin of error decreases, and a small variance outside accepted tolerance levels can result in stability issues and cause system problems like the ones mentioned above. As an enthusiast, you need memory that consistently meets the performance demands of your system.

"The last thing an enthusiast wants to deal with is the mayhem caused by a memory failure," said Brandon Guthrie, Crucial senior technical analyst. "When your memory goes bad it can cause problems that are difficult to diagnose without memory testing applications or expensive memory testing equipment. Crucial's Ballistix™ modules provide the performance that we enthusiasts demand from our creations."

Performance. Stability. It's fundamental.

Crucial's new Ballistix™ high-performance memory line is designed specifically for computer gamers and power users seeking maximum system performance and stability. Featuring advanced speed grades, low latencies, and integrated aluminum heat spreaders, Ballistix™ modules deliver the powerful performance you want and the stability you need.

Crucial offers the following Ballistix™ memory modules.

Ballistix™ Available Modules

256MB and 512MB DDR	256MB and 512MB DDR2
PC-3200 (DDR-400) CL2	PC2-4200 (DDR2-533) CL3
PC-4000 (DDR-500) CL2.5	PC2-5300 (DDR2-667) CL4

Go to www.crucial.com/gaming
to learn more about performance memory.

Enter to Win!

The Crucial Dream Machine Giveaway

Enter to win the Crucial Dream Machine ultimate gaming system featuring Crucial® Ballistix™ memory custom built by the geeks in the Crucial Performance Lab (valued at $4,999).

www.crucial.com/gaming

You know you want it!

Official Sweepstakes Rules

CRUCIAL TECHNOLOGY
Official Rules
No Purchase Necessary

1. How to Enter: To enter, visit the Crucial Technology web site at www.crucial.com/gaming and complete the entry form. The limit is one entry per person, per household and per e-mail address. Sweepstakes will begin on August 4, 2004 and all entries must be received by September 30, 2004.

2. Winner Selection: The winner will be selected in a random drawing on October 8, 2004, from among all eligible entries received. The drawing will be conducted by Crucial Technology, whose decision will be final. Odds of winning depend on the number of eligible entries received. For example, if there are 10,000 eligible entries, each eligible entry will have a 1/10,000 chance of winning the prize. The prize will be awarded. The winner will be announced on October 8, 2004, on the web site. The winner will be notified by e-mail. Non-winning entrants may receive a special product offer via e-mail.

3. Prize: The winner will receive a prize consisting of: one (1) 'Dream Machine' gaming system valued at $4,999. The game system will include a Crucial Ballistix™ DDR2-powered Intel Pentium 4 LGA 775 PC, a monitor, 5.1 surround sound digital speakers, gaming software, gaming controllers, and headset. No transfer of prize permitted.

4. Eligibility: This contest is open to US residents only 18 years of age or older at the time of entry and who properly enters the contest in accordance with paragraph 1 above. Employees of Crucial Technology, its subsidiaries, affiliates, and advertising and promotion agencies, and the family members and/or those living in the same household of any such employees are not eligible.

5. General Conditions: This contest shall be controlled by the laws of the State of Idaho, U.S.A. and all applicable federal and state laws shall apply. All entrants agree to abide by these official rules and by the decision of Crucial Technology, which shall be final and binding. Return of any prize or prize notification or failure to acknowledge Crucial's award notification within twenty-four (24) hours of the time such notification is made may result in disqualification and selection of an alternate winner. Acceptance of prize constitutes the granting of permission by the winner for Crucial Technology to use the winner's name and likeness, including photographs, for advertising and promotional purposes without additional compensation, unless prohibited by law. Contest limited to the continental U.S.

Crucial Technology assumes no responsibility for any error, omission, interruption, deletion, defect, delay in operation or transmission, communications line failure, theft or destruction or unauthorized access to, or alteration of, any entry. Crucial Technology is not responsible for any problems or technical malfunction of any telephone network or lines, computer online systems, servers, or providers, computer equipment, software, failure of any e-mail entry to be received by Crucial Technology on account of technical problems or traffic congestion on the Internet or at any web site, or any combination thereof, including any injury or damage to entrant's or any other person's computer related to or resulting from participation, or downloading any materials, in this contest. CAUTION: ANY ATTEMPT BY A CONTESTANT TO DELIBERATELY DAMAGE ANY WEB SITE OR UNDERMINE THE LEGITIMATE OPERATION OF THE CONTEST IS A VIOLATION OF CRIMINAL AND CIVIL LAWS AND SHOULD SUCH ATTEMPT BE MADE, CRUCIAL TECHNOLOGY RESERVES THE RIGHT TO SEEK DAMAGES FROM ANY SUCH CONTESTANT TO THE FULLEST EXTENT PERMITTED BY LAW AND TO RECOVER ALL COSTS INCURRED. Crucial Technology reserves the right to cancel the contest if it becomes technically corrupted. If you have any questions about the contest, you may contact Crucial Technology at (208) 363-5500.

6. Publication of Winner's Name: The name of the prize winner will be posted on or about October 8, 2004, on the Crucial Technology web site.

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Advanced Q&A Corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Each month we dig deep into the mailbag here at CPU in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable? CPU's "Advanced Q&A Corner" is here for you.

Joe P. asked: I have an Athlon XP 2600+ with 512MB of PC3200 DDR RAM, and my friend has a similar system with a Pentium 4 2.4GHz. We both run a lot of video- and music-editing/encoding applications, and it seems that my friend's system runs the programs much better than mine. When it comes to the encoding and editing, my friend's system is much faster, but when actually launching the programs, my system is definitely quicker. I've also noticed that my system is much better for gaming. I want to upgrade my system, but I'm not sure if I should go with a P4 or an Athlon 64. I do more editing and encoding than anything else, but I also play the occasional round of Unreal Tournament 2004.

A: Without knowing which video cards the systems are running, we can't say your processor is the sole reason for your system offering better gaming performance because an Athlon XP 2600+ and 2.4GHz P4 are pretty evenly matched. The P4, however, does have a distinct performance advantage when running most video and audio encoding/processing applications. Some popular applications like XMPEG, the LAME MP3 encoder, and Microsoft's Windows Media Encoder 9, for example, have all been optimized for the P4. We've done extensive testing with these applications recently and found that a 3.4GHz P4 outperformed anything AMD had to offer, including the mighty Athlon 64 FX-53. The P4's Hyper-Threading capabilities and SEE optimizations make it perform very well when an application is written specifically to take advantage of these features. Athlons generally offer much better gaming performance, though. In a recent review of Intel's new LGA-775 3.6GHz P4, AMD's Athlon 64 3800+ and FX-53 outperformed the P4 in all of the gaming benchmarks we ran. They also outpaced Intel's fastest processors in our office and content creation application performance tests. If your day is absolutely filled with audio and video encoding, you should go with a fast P4, but for virtually any other situation, an Athlon 64 will probably be the better choice, especially if a Socket 939 Newcastle or FX-53 will fit your budget.

Gerardo asked: I am considering buying an Athlon XP 2500+ and a P4 2.4C GHz processor for two separate PC configurations, with overclocking in mind for both. I have read about overclocking procedures and techniques for both, like drawing pencil lines on the AMD CPU to unlock it and BIOS tweaks for the 2.4C GHz to get it running at 3GHz. This seems like an exciting project; however, I'm unsure as to what kind of cooling solution I should place in my system. Should I use watercooling or a certain heatsink/fan combo?

A: There are lots of good cooling solutions beyond stock Intel or AMD heatsink/fans, Gerardo. It just depends on how involved you want to get or what your level of experience is in the art of overclocking. Regardless, here are some good suggestions to get you going.

P4 Heatsinks (Socket 478):

Thermalright SLK947U
www.thermalright.com/a_page/main_product_slk947u.htm
Aerocool DP-102
www.aerocool.us/cooler/dp102.htm

The Aerocool Deep Impact 102 is a hefty, tall cooler for the P4, but it also has great thermal absorption and heat transfer characteristics.

AMD Heatsinks (Athlon 64):

Zalman CNPS7000A-Cu
www.zalman.co.kr/eng/product/view.asp?idx=79
SwiftTech MCX64-V
www.swiftnets.com/products/mcx64-V.asp

Watercooling:

Asetek WaterChill
www.vapochill.com/main/page.asp?sideid=420
Koolance Exos
www.koolance.com/products/product.html?code=EXT-A04

Vapor-phase Refrigeration:

Asetek Vapochill

The Koolance Exos is a great self-contained watercooling kit that is fairly easy to set up and offers quiet top-shelf cooling that blows aircooling out of the water.

www.vapochill.com

These are what we would call higher-end products, all offering best-in-class performance. Our recommendation, if you are new to overclocking, as with anything else in life, is you should walk before you run. Start with some of the standard heatsink/fan combos we list above. If you are successful and are able to get

The Asetek Vapochill is the pinnacle in high-performance refrigerated cooling for overlocking. Although pricey, it can chill your CPU down to subfreezing temperatures for serious overclocking feats.

some experience under your belt, you'll get the itch (almost everybody does eventually) to take things to another level. That's when you can try your hand at watercooling or vapor-phase refrigeration.

Astek's refrigeration unit, called VapoChill, literally uses a small minirefrigeration compressor (like those found in small cube refrigerators) to cool down a copper plate at the end of a long pipe that is mated to your CPU with an insulated boot. This setup provides the ultimate overclocking experience and chills your CPU down to subfreezing temperatures. However, it's definitely not a setup for a novice, and it's pricey at over $800. In the watercooling space, Koolance's Exos kit provides quiet watercooling with better overclocking than standard air-cooling, and it's not a huge project to get setup. Either way you go, we're sure you'll get hooked on the fine art of overclocking. Good luck!

HugeKebab asked: Over the last few months, I've noticed that the Radeon 9800 Pro has been getting cheaper and cheaper. I want to buy one, but it's got to be really silent. I tried a "Built by ATI" card a couple of weeks ago and ended up returning it because of the high-pitched whine coming from the stock fan. Are there any Radeon 9800 Pros that are more silent than the ATI version?

A: You're in luck. Sapphire Technology (www.sapphiretech.com) actually offers a complete line of absolutely silent Radeons. Its Ultimate Edition Radeons are equipped with large, passive heatpipe coolers that don't generate any noise at all. You will need to have good case ventilation, however. Because they are passively cooled, there are no fans installed on Sapphire's Ultimate Edition Radeons to cool the heatsinks mounted to the GPU and onboard RAM chips. Without any air circulating over the heatsinks, excessive heat could build up and cause some system instability or even damage the card, so make sure your case is clean and your intake and exhaust fans are working well. You'll also have to pay a bit of a premium to get your hands on one of these cards. Sapphire's Atlantis Radeon 9800 Pro Ultimate Edition is currently selling for about $20 to $30 more than standard Radeon 9800 Pros.

Warren asked: I just finished building a P4 2.53GHz 533FSB computer, and it only benchmarks 5992 on 3DMark2001 SE.

The hardware I installed is an Abit V17 motherboard, Western Digital 160GB 7,200rpm hard drive with 8MB cache, 256MB PC3200 memory, Gigabyte FX5200 128MB video card, Lite-On 52X CD-RW, Lite-On 16X DVD, Windows XP Home, and an X Dreamer II case with a 350W power supply.

My friend has a PIII 1000MHz computer with an XFX FX 5900 128MB video card, an ASUS CUSL2-C motherboard, and 512MB of PC133 memory, and his system benchmarks 7700. I'm on a pretty tight budget, so could you please tell me what I can do to improve performance in a best-bang-for-the-buck order?

A: Let's start with the obvious gaming bottleneck in your system, Warren. That GeForce FX 5200 card is probably 99.9% of the delta between your friend's score and yours. The fill rate of your graphics card is about half the fill rate of your friend's GeForce FX 5900. Fill rate is the number of pixels that can be rendered per second by a graphics processor (pixels are literally the dots that appear on your computer display that comprise an image or scene). The GeForce FX 5200's fill rate is about 1000Mpps (megapixels per second), and the fill rate on the GeForce FX 5900 is 1800Mpps. So therein lies the rub. Your graphics card is about half as fast as the one in your friend's computer and you are doing that 2.53GHz P4 a significant injustice by not pairing it up with a more worthy GPU.

Our suggestion would be to look at a GeForce FX 5900 or perhaps an ATI Radeon 9800 Pro. Both cards are in the same price range, relatively speaking, and we probably would lean toward the Radeon card, if we had our druthers, because it offers about 3040Mpps of fill rate. The final thing you'll want to do is add more RAM. You only have 256MB, and the minimum we suggest for a serious gaming experience is 1GB. RAM is relatively inexpensive these days, but if you're on a budget, save money on the RAM and go with another 256MB stick for a total of 512MB. Just make sure you upgrade that graphics card. That GFFX 5200 is a real bargain-basement model heading for complete obsolescence very quickly. ▲

Sapphire's Atlantis Radeon 9800 Pro Ultimate Edition is passively cooled and generates absolutely no noise.

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com

For more answers to your questions, subscribers can go to www.cpumag.com/cpusep04/q&a

Batteries

The Challenge For More Power

Batteries are both the greatest invention for and worst hassle of working while on the go. When your portable device batteries are charged, your workday possibilities are limitless. When the low-battery light comes on, however, it's your troubles that become limitless. Your ability to work screeches to a halt as your quest for an electrical outlet begins.

Innovations in the portable electronics market are also becoming limitless. Cell phones are no longer just cell phones; they've added several features, including high-end color screens and PDA-like functions. Portable video game players, MP3 players, and portable video players are all adding features and innovations, as well.

Unfortunately, the innovations—and the power drain they cause—seem to be more than most of today's battery technologies (led by Li-Ion) can manage. Portable device manufacturers are worried that current battery technologies can't give the power needed to make the new features work for an acceptable length of time.

New battery technologies are on the way, led by fuel cells, and they promise to give consumers enough power to run their MP3 players, cell phones, and portable video players at full strength—and no electrical outlet may be needed.

Fuel Cells

Fuel cells could deliver five to 10 times the power of a Li-Ion battery of comparable weight. (See the "Fuel Cells In Action" sidebar for information on how fuel cells work.) Most fuel cells currently in development make use of methanol as a fuel.

Several companies are involved in fuel cell development, including Fujitsu, Hitachi, Motorola, NEC, Toshiba, and PolyFuel. Researchers at Manhattan Scientifics and SRI International also are working with fuel cell chemistry.

One of the biggest problems in fuel cell development has been the membrane that separates the original methanol/water solution from the final solution where the methanol has broken down. When unaltered methanol leaks into the final solution, the fuel cell's efficacy is reduced.

Earlier this year, Fujitsu announced it has improved the strength of the membrane, reducing the methanol leakage and improving battery life. Fujitsu said its findings would allow a 30% methanol solution to power a fuel cell for a notebook for eight to 10 hours. Fujitsu's announcement came a few months after Hitachi announced a similar improvement that would allow a 20% methanol solution. (Higher methanol concentrations provide longer battery life and more power.)

In June, Fujitsu announced plans to begin selling a DMFC (direct methanol fuel cell) that can power small portable electronics for about 20 hours. The tiny fuel cell measures about 2 square inches and is less than 0.4 inches thick. Larger

Cell Phone Power Requirements

Future cell phones will incorporate several features that have strong power requirements. The new Nokia 7700 (currently available outside the United States) looks more like a PDA than a cell phone and needs at least 3000 mW (milliwatts) of battery power. Most traditional cell phone models need 2000 mW or less. The 7700's components and their power requirements include:

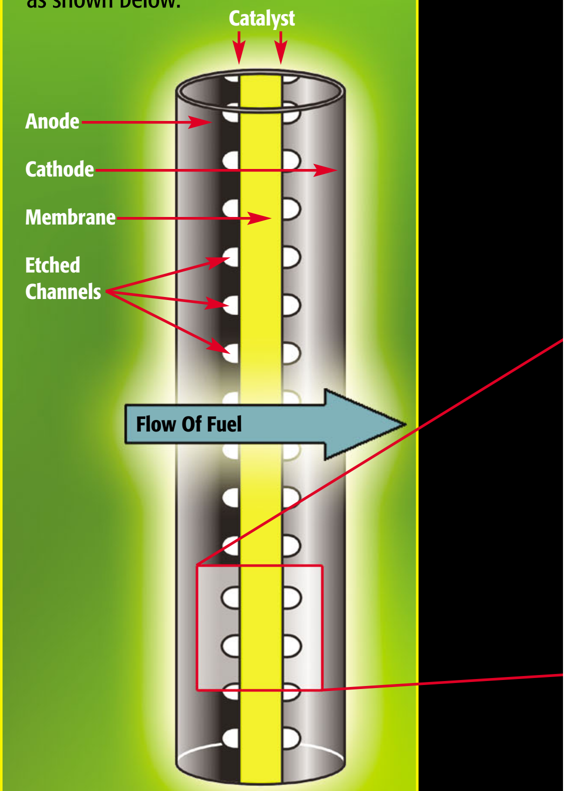
Application processors. 600 mW
Audio codec/amplifier. 300 mW
Display (full color with backlighting). 300 mW
Memory areas. 200 mW
RF modem/amplifier. 1200 mW
Miscellaneous peripherals. 400 mW

Fuel Cells In Action

Although fuel cells have a function similar to a battery–providing electrical power to portable devices–they generate the power using vastly different methods. A battery stores electrical energy as chemical energy and then converts that chemical energy to electrical energy, as needed. A fuel cell is a device that produces energy by converting hydrogen and oxygen into water. Fuel cells use different types of fuels to generate energy. You can recharge a fuel cell by adding more fuel. Because it's difficult and dangerous to transport pure hydrogen gas, most fuel cells use methanol as the fuel. When using methanol, the fuel cell must employ a reformer, which is a device that converts the methanol to hydrogen, as shown below, on the top.

$$CH_3OH \text{ to } CO + 2H_2$$
$$CO + H_2O \text{ to } CO_2 + H_2$$

To limit the release of carbon monoxide gas, most reformers add water to the methanol, creating less harmful gases, carbon dioxide and hydrogen, as shown above, on the bottom. With its hydrogen created, the fuel cell can begin generating energy, as shown below.



fuel cells, designed to power notebooks, could appear late in 2004, Fujitsu says.

Methanol may be the most popular option currently among researchers, but it isn't the only option. Researchers at Saint Louis University have been experimenting with ethanol fuel cells. The researchers say using ethanol is safer, and ethanol is far more available to the general public—those who are of legal drinking age. If the research continues, you could pour a few drops of booze into your cell phone and power it for a month, the researchers say.

Zinc Oxide

Although zinc oxide isn't the most well-known of the battery technologies vying to supplant Li-Ion, it does have the backing of one of the top tech companies: Intel.

Earlier this year, Intel and ZMP (Zinc Matrix Power) partnered to develop zinc oxide batteries (scheduled for demonstration at this fall's Intel Developer Forum). Batteries using zinc oxide technology could be available by 2006.

Although zinc oxide cells can generate about twice the amount of power vs. a Li-Ion cell of the same size, early prototypes have had problems with recharging. ZMP has developed a special matrix for locking the zinc oxide in position and improving its ability to recharge. ZMP officials also say zinc oxide cells don't suffer capacity loss when undergoing several quick recharges.

Solar Cells

Running a portable device (especially a cell phone) off a battery that draws power from the sun and other light sources is a great idea. But that idea hasn't been anywhere near practical until recent advancements, even though solar panels and cells (in large sizes) have been in use for decades.

Shrinking solar cells to a manageable size to power a portable device has been a difficult task. Several companies are working on the problem, including General Electric, Siemens, STMicroelectronics, Nanosys, and Konarka Technologies. Breakthroughs in nanotechnology also are contributing to advancements in solar cell research. Most of the research centers on replacing expensive silicon solar panels with thin, plastic-coated strips for solar cells.

Researchers are making the solar cell material "printable," meaning manufacturers would apply the coating to the plastic strips as easily as an inkjet printer applies ink to paper. Konarka recently announced a breakthrough in this area, creating plastic films that protect titanium dioxide coated with light-absorbing dyes. Konarka hopes to begin selling its solar films to manufacturers of portable devices sometime in 2005.

The Cost Factor

Although the new battery technologies sound promising, they all have one serious problem: high cost, at least when compared to more established portable device battery chemistries. However, with so many companies competing to develop new battery technologies, the cost of the new batteries should drop quickly once they're established in the market.

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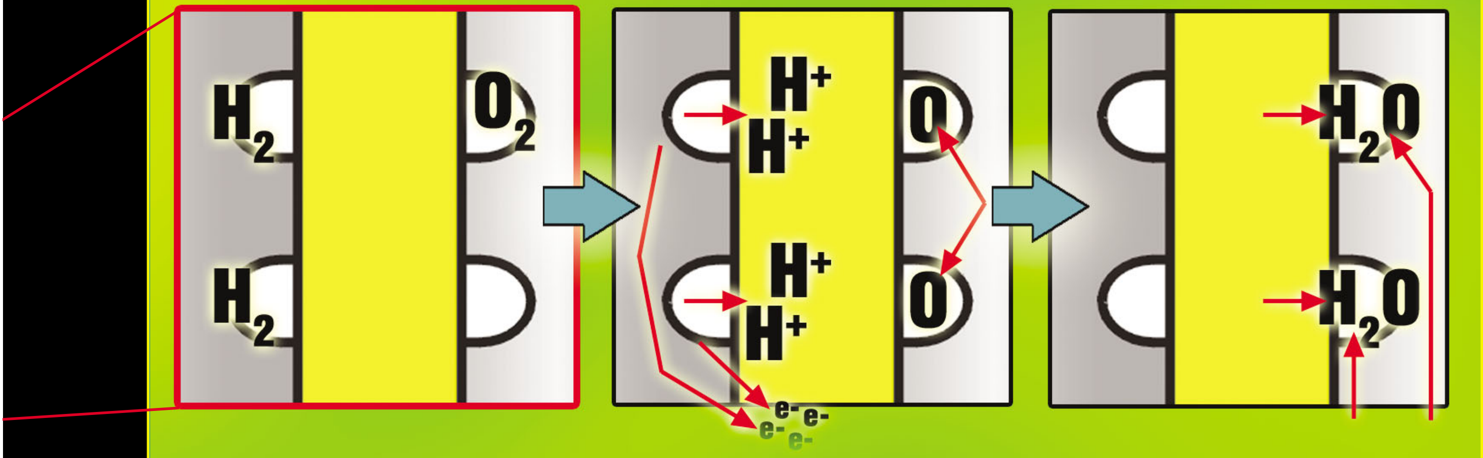
by Kyle Schurman

For bonus content, subscribers can go to www.cpumag.com/cpusep04/battery.

1 Pressurized hydrogen gas (H_2) enters the channels of the anode, and oxygen (O_2) enters the channel of the cathode. The oxygen comes into the fuel cell from the surrounding air.

2 As the hydrogen gas (H_2) touches the platinum powder (the catalyst) coating the membrane, it splits into two positively charged hydrogen atoms (H^+) and two electrons (e^-). The membrane allows the H^+ atoms through to the cathode. The membrane blocks the electrons, forcing them to travel through an external circuit. The movement of the electrons generates power for the fuel cell through a direct current voltage. As the oxygen (O_2) touches the platinum powder, it splits into two oxygen atoms (O). They each carry a negative charge, which helps draw the H^+ atoms toward the cathode.



3 As the H^+ atoms reach the cathode and the O atoms, they combine with the electrons traveling through the external circuit to create water molecules (H_2O). The fuel cell releases the water vapor as a harmless discharge.

Sources: Motorola, HowStuffWorks.com, PolyFuel

RFID

Big Benefits Or Big Brother?

The thought that big government and big business could abuse its power to take advantage of people is nothing new. George Orwell's book, "1984," was published 55 years ago, and the idea of Big Brother became part of the mainstream.

Since then, dozens of new technologies have appeared designed to simplify and enhance people's lives and business practices. But many of those same technologies create situations or information that individuals and organizations can exploit or abuse—hence, many such technologies receive the Big Brother label. For example, electronic voting promises to simplify the democratic process and remove human error from the vote counting equation, but the possibility of fraud and vote tampering has many people leery of e-voting.

The possibility of exploitation behind those technologies pales in comparison to the possibilities for problems with the next generation of tracking technologies, led by RFID (radio frequency identification). Yet, when used as intended, RFID holds great promise for reducing overhead costs for retailers and for improving people's lives, too.

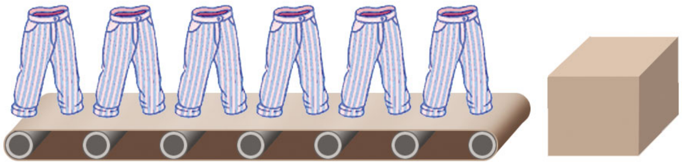
Beam Me Up

The idea behind RFID technology involves attaching a miniscule transmitter and microchip combination, called an RFID tag (or an electronic tag or a smart tag), onto nearly every retail product available.

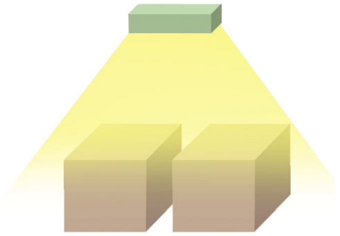
The RFID tag contains a unique code, called an EPC (Electronic Product Code), that identifies each individual product. RFID tags are similar to bar codes; however, with an EPC, an RFID tag goes further, identifying each individual product

From Assembly Line To Clothes Line

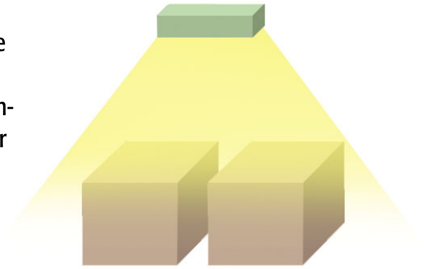
① At the factory, the manufacturer inserts RFID tags, uniquely identifying each pair of pants. Once the pants leave the assembly line, the manufacturer boxes them up. Without RFID technology, the manufacturer later wouldn't know exactly how many pairs are in each box or wouldn't be able to find a particular pair without opening each box.



② Before each box leaves the factory, each box is scanned using a handheld RFID scanner (left) or an automatic scanner (right), making sure each box contains the correct number of pairs of pants and the correct merchandise. With the correct order calculated using RFID, the manufacturer loads the boxes onto trucks.



③ After the trucks arrive at the retailer, each box is RFID scanned. The retailer verifies the number and types of pants in the shipment without needing to open the boxes, which greatly simplifies and expedites the delivery process. The retailer also uses the scanning information to update its inventory data in a central computer.



in the manufacturing run. For example, standard bar codes can't distinguish one digital camera from any other camera of the same model. The RFID tag uniquely marks each digital camera of the same model using the EPC. You can think of the EPC as being similar to the VIN (vehicle identification number) that uniquely identifies each automobile.

The RFID tags proposed today vary greatly in shape and size (see the "RFID Tags" sidebar), and the components are constantly shrinking. For example, one company is offering microchips that are the size of a grain of sand. Many are thin enough to fit inside the layers of a paper or plastic label without being noticeable.

Most RFID tags will be read-only, meaning they emit information programmed into them by the manufacturer. However, some RFID tags will offer read/write capabilities, letting a retailer add information to the tag within each product.

Miniscule Chips, Endless Possibilities

If RFID sounds like some futuristic idea that you can worry about around the end of the decade, think again. Most industry experts say RFID will begin appearing in large quantities of everyday retail products—perhaps billions—in 2005. With RFID technology, it's a matter of when, not if, it will appear.

Most experts say the cost of manufacturing and inserting RFID tags is the biggest hurdle to overcome (at least from the retailer's point of view). With costs for RFID tags initially ranging from 10 cents to 25 cents apiece (depending on the quantity ordered and the sophistication of the RFID tag), manufacturers probably will opt to include them in more expensive items. Experts say once RFID tags reach a particular price point, probably less than 5 cents apiece, they'll appear in almost every product that costs more than a few dollars. With dozens of companies involved in RFID research and development, and with dozens of large retailers waiting for RFID products, it shouldn't take long to reach the key price point.

For retailers, the possibilities for RFID technology are almost endless. (To see the potential journey of an

Passive RFID Tag Frequencies

Passive RFID tags operate at different radio frequencies, depending on the maximum read range they need. Lower frequency tags cost less than higher frequency tags. For those who need a wider read range, they can try active RFID tags, which include a small battery to boost the antenna's signal. (*NOTE: Frequency ranges are different in the United States, Europe, and Asia. Also, different materials, such as certain types of liquids or metals, can affect the read range of the antenna signals.*)

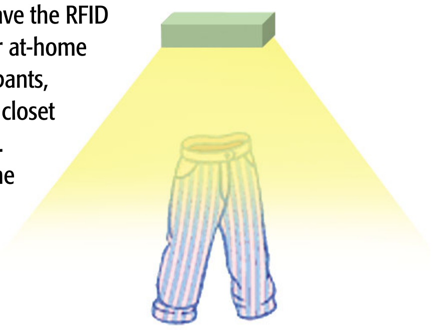
Tag Type	Frequency Range	Common Frequency	Max. Read Range
Low Frequency	100KHz to 500KHz	125KHz	1.5 feet
High Frequency (also called Intermediate Frequency)	10MHz to 15MHz	13.56MHz	3 feet
Ultra-High Frequency (also called High)	850MHz to 950MHz	868MHz or 915MHz	10 to 20 feet
Microwave Frequency (also called Ultra-High)	2.45GHz to 5.8GHz	2.45GHz or 5.8GHz	10 to 20 feet

4 After the pants are unloaded and placed on store shelves, a customer decides to purchase a pair. As the salesperson scans the pants at the cash register using a handheld RFID scanner, the EPC transfers the data to the central computer, which notes exactly which pair was sold, adjusting the inventory count. It then sends the price of the pants to the cash register. Depending on what type of data the retailer is collecting, the central computer might link the RFID tag in the pants to the customer's personal information for future reference, such as later offering the customer targeted sale prices or advertising.

At this point, the retailer has the option of disabling the RFID tag. In this scenario, the customer has chosen to leave the RFID tag active.

5 Because the customer chose to have the RFID tag remain active, she can use her at-home RFID scanner to keep track of the pants, whether they're hanging in the back of the closet or in the middle of the pile of dirty laundry.

Of course, by leaving the RFID tag active, the customer leaves herself open to having anyone with an RFID reader scan her pants at any time.



individual product using RFID technology, see the "From Assembly Line To Clothes Line" sidebar.) Retailers expect the cost savings that RFID will generate will justify the cost of the RFID tags. Fewer employees will be needed to manage inventory or run cash registers. Shoplifting will almost disappear. With precise inventory counts, stores can better manage products, requiring less warehouse space.

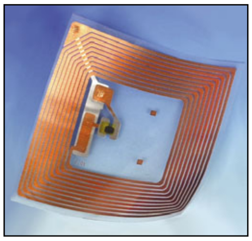
Big Brother Retailers?

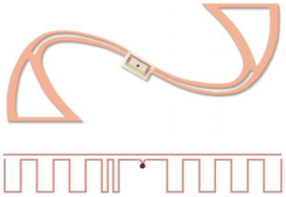
The RFID technology benefits for consumers aren't quite as obvious, however, which has consumer advocacy groups upset over the impending implementation of the technology. (See the "RFID Pros & Cons" sidebar for more information.) Currently, no laws covering the use of RFID tags exist in the United States. Manufacturers and retailers currently do not have to tell you when they're using RFID tags in products.

Those worried about the technology say retailers need to give consumers unwavering assurances that the information the

RFID Tags

In the RFID tags below, the RFID chip is the large piece in the middle of the tag. The line winding around the chip is the tag's antenna. RFID tags can appear in many shapes, although many are close to squares, as shown here. Some may be different shapes to fit within a certain type of label.





How Do I Find A Hidden RFID Tag On A Product?

- Peel off the paper sticker or label. Hold it up to a light source and look for lines that could indicate an antenna.
- The materials used in the RFID tag typically show up in an X-ray.
- RFID tags embedded in cardboard might leave a raised area on the cardboard.
- It appears that running an RFID tag through a microwave oven will destroy the tag. However, it almost certainly will destroy the object, start a fire, or destroy the oven, too, so we'd recommend avoiding this method of finding an RFID tag.

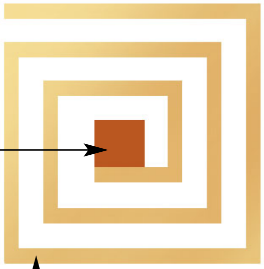
How RFID Works

The RFID tag consists of two parts, the antenna and the RFID chip.

The RFID chip, which can be as small as a grain of sand, contains all of the product's information through the EPC. RFID chips can be passive, meaning they have no internal power source, or active, meaning they're self-powered via battery.

Passive. Passive tags are much less expensive than active tags and they require no maintenance. However, the passive tag's maximum read range is less than 20 feet. Also, some liquids and metals block the antenna's data signal.

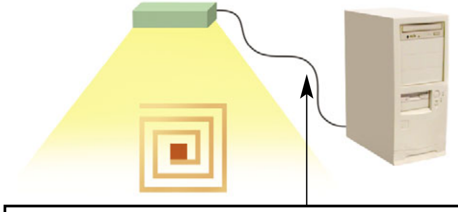
Active. Active tags require some maintenance because the battery only works for about 20 hours of transmission. However, they work extremely well for large objects thanks to their maximum read range of about 100 feet. Metals and liquids don't hinder the active tag signals as strongly as passive tag signals.



The RFID tag's antenna winds around the RFID chip and emits a radio signal that transmits the information in the RFID chip.

With a passive RFID tag, an RFID reader creates a magnetic field. As the passive RFID tag passes through the magnetic field, it uses the magnetic energy to "wake up." The RFID tag then modulates the magnetic energy to transmit data back to the RFID reader. The RFID reader has no line-of-sight requirements to pick up the signal. (For more information on the frequencies RFID tags use, see the "Passive RFID Tag Frequencies" sidebar.)

An active RFID tag uses its battery power to constantly transmit data. When an RFID reader is in range, it picks up the data.



The RFID reader, which can be a handheld or stationary device, can then connect to a centralized computer network (either wirelessly or through a wired connection) and upload all of the information it has detected from the RFID tag.

RFID Pros & Cons

As with any debate, those for and against the implementation of RFID technology have made their opinions known on a variety of ideas related to using RFID. Here's a quick look at a few topics in the debate.

Idea: As you walk past an RFID reader when exiting a retail store, your purchases are automatically read and charged to your credit card, probably by using another RFID tag in your wallet to identify you.

Pro. You could avoid checkout lines and save a lot of time by paying automatically.

Con. Do you want your credit card permanently on record with a particular retailer? Also, this method allows the retailer to easily link your purchases with your credit card and personal information, which could generate some unwanted advertisements.

Idea: RFID tags could allow a retailer to tailor special sale prices to you based on the RFID-tagged products you're carrying or wearing while walking through the store.

Pro: This idea resembles the widely accepted practice of grocery stores offering "frequent shopper" cards that yield special discounts. Everyone would like to receive a discount on products they normally buy.

Con: Do you really want a retailer to know exactly what you're wearing or what products you're carrying in your pockets or purse? And where else will that information appear?

Idea: Retail malls could provide advertising specific to you–similar to what appeared in the movie "Minority Report"–by constantly scanning you for any RFID tags you're carrying or wearing. For example, you bought a shirt at Store A. A few days later, Store A's RFID scanners "read" that particular shirt as you walk past the store. The RFID technology links that shirt to you and your personal information, and Store A's advertisements can speak to you directly. If retailers share this information, every store could identify you by the shirt you're wearing.

Pro: Targeted advertising probably will be of more interest to you than blanket advertising.

Con: Does anyone really want a bombardment of more advertising, targeted or blanket? Also, do you want a retailer–or anyone else with the proper RFID reader, for that matter–knowing your exact location at a certain time of the day? (Not to mention the fact that advertisements calling you by name would be more than a little creepy.)

Idea: Police could use RFID tags on products and in currency to easily find stolen items or counterfeit bills through random scanning of people and products.

Pro: Anything that helps reduce crime is beneficial to society as a whole. Those who have nothing to hide should have no problem with the occasional scan by police.

Con: Do you really want anyone to be able to determine how much cash you're carrying with a random scan? What type of information will police legally be able to collect through these random scans? Invasion of privacy and potential abuses are huge problems with this idea.

Idea: RFID technology can be used at home for a variety of reasons with home-based electronic tag readers.

Pro: If you can't find your favorite shirt, an active RFID tag in the shirt and a reader could tell you the shirt is hiding in the back of the closet or is stuck in the middle of a pile of dirty laundry. If you need a replacement for a particular product, you could scan the product's active RFID tag at home, upload the information to hundreds of retailers through the Internet, and find a replacement at the best price in less than a minute.

Con: Do you really want someone–maybe a criminal walking around your home with an RFID reader–to potentially have access to a list of all RFID-tagged products in your home? And, to make this idea work, you'd have to leave all RFID tags in your products active, which leads to potential abuses of the system we've already discussed.

RFID tags could collect won't be used to violate consumer privacy. They say retailers need to automatically disable the RFID tag as soon as the consumer leaves the store unless the consumer chooses to keep the tag active. (Some RFID manufacturers have proposed deactivating the RFID tags only if the consumer requests it.)

Even with such assurances, though, some people will never trust the retailers and information collection agencies to respect the privacy of consumers. Other people will have no problem allowing retailers to collect as much information as possible, trusting them to be responsible with any information the RFID tags generate.

Either way, RFID tags are the latest in a long line of technologies that hold amazing promise for those who use them as intended but also hold dangerous possibilities for those who choose to abuse them. One thing's for certain: The push toward RFID technology isn't going to slow down, meaning it's up to consumers to push lawmakers to make sure new technologies, such as RFID tags, aren't being used to abuse their rights. CPU

by Kyle Schurman

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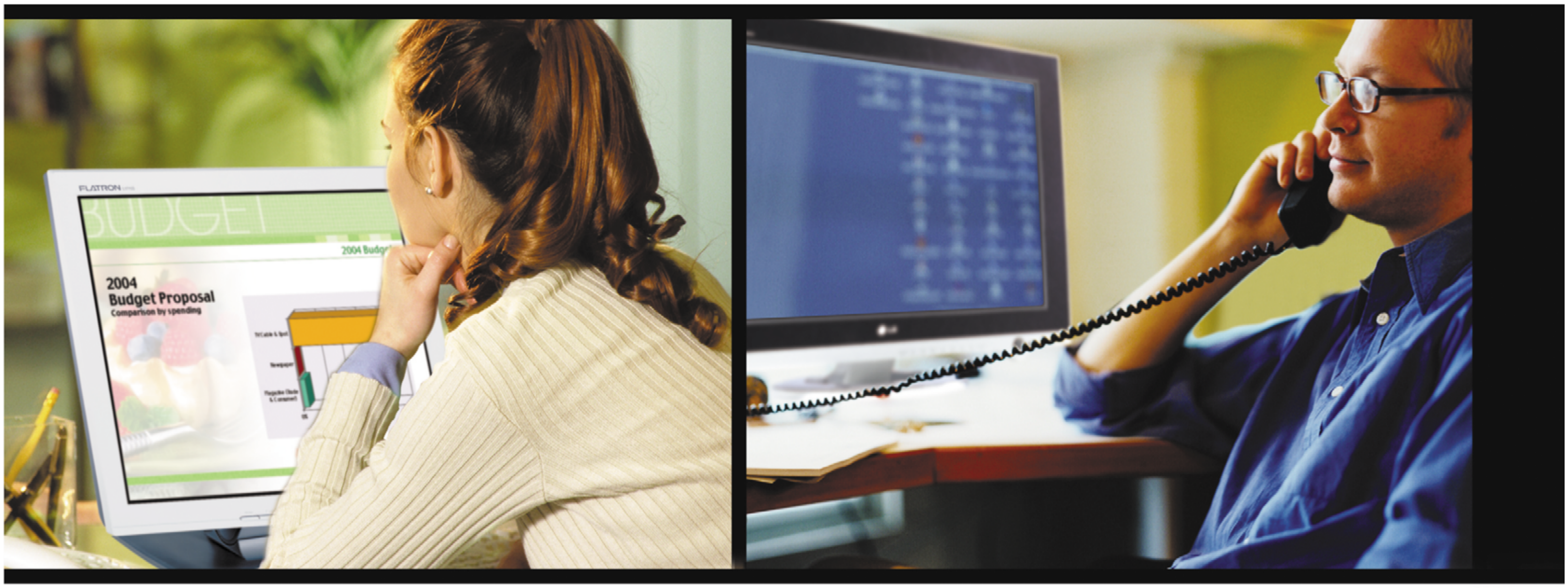

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50 HACK YOUR HARDWARE
Modding Tips & Tricks For The Hardcore

50 LAP HEATSINK/CPU
52 ATI RADEON 9800 PRO
54 MASK AN OPTICAL DRIVE
55 ATI RADEON X800 PRO
REGION-FREE DVD PLAYER

58 PRY OPEN YOUR PVR
TiVO & ReplayTV Under The Knife

64 MAKE A BIGGER, BETTER DIGITAL DEVICE
Modify Your MuVo2, Nokia 6800 & Canon Digital Rebel

HACK AT YOUR OWN RISK

Please bear in mind that in all cases, hacking hardware will nullify your product's manufacturer warranty. Proceed at your own risk.

Hacking is, unfortunately, an insidious word in mainstream society. It insinuates late-night deviance on script kiddie IRC channels, a tendency toward anarchical political views, and worse, the hallmarks of a social outcast. That's a narrowly wry stereotype, though. Hackers run the gamut of veritable criminals to dedicated security experts working to protect delicate infrastructures. They don't even limit themselves to software, either.

There are a significant number of hobbyists who've ventured into tinkering with their hardware, too. Not that hacking hardware is a new concept; as far back as the late 1960s, Joe Engressia discovered he could whistle the 2,600Hz tone that seized control of a trunk line, enabling free long-distance dialing and giving birth to decades of phone phreaking. More recently, processor overclocking has developed into an almost mainstream obsession, even amidst rumors that Intel is using a limiter in its 925X chipset to stifle the efforts of those looking to realize the full potential of their 90nm P4 processors.

Hardware Hacking: A Dubious Beginning

Before hackers were exploring computers, coming up with ways around the most sophisticated security systems, they were probing the then-modern phone networks. Some of their discoveries were accidental, such as the blind Engressia's perfect-pitch whistle and John Draper's discovery that a promotional toy in Cap'n Crunch cereal generated the same 2,600Hz tone used to make long-distance calls around the world anonymously.

Other developments in the underground phone phreaking world were more deliberate. For example, Draper, with the help of a friend, built the first blue box, a multifrequency device used to generate six different tones. The tones controlled long distance switching, so anyone with one of Draper's blue boxes could explore the phone company's network. He introduced Steve Wozniak, Steve Jobs, and Bill Klaxton to the blue box, eventually learning that Wozniak had started building the devices and selling them for $150 apiece.

Although phreaking began innocently enough, dissemination of manufactured blue boxes led to an increased incidence of toll fraud, and those involved found

SCRATCH & RIP

Cactus Data Shield, a CD copy-protection scheme formerly licensed by Midbar Tech and now owned by Macrovision, was intended to prevent the illegal reproduction of audio discs. Instead, it causes PCs to crash and Macs to lock permanently. What's worse, ink from a black marker on the disc's outer track often circumvents the technology.

themselves in legal trouble. Draper ended up spending four months in prison after being convicted of fraud by wire. And while other phreaking devices sprang up (most notably the red box for emulating the sound of coins dropping into a pay phone slot), the eventual transition to digital systems meant that the old techniques for making free phone calls no longer worked. Consequentially, hardware hacking shifted from phone networks to computers, where Wozniak and Jobs ended up spending most of their time. They went on to start Apple.

THE DEFEAT OF WEP

Originally touted as the end-all in wireless security, WEP is easily hacked using a Linux system, AirSnort, and roughly 5 million packets from the target network. Though hardly funny, there's definite irony in this simple hack for such an ambitious security standard. The simple solution is to use WPA instead.

The Evolution Of Hardware Hacking

Computer hardware seems to advance much faster than the software that it runs. As such, there's little perceived utility in hacking hardware, whereas software is more easily exploitable. Nevertheless, the quest for higher performance, enhanced functionality, and good old-fashioned curiosity goads the technically savvy into sacrificing warranties in the name of pushing hardware beyond manufacturer-specified limits.

Perhaps the most relatable form of hardware hacking is the popular practice of overclocking, running a component above and beyond its guaranteed clock frequency. While most prevalent with CPUs, video cards are also overclocked, as are chipsets and memory modules. Such modifications aren't illegal, though you'd be hard-pressed to find a manufacturer that supports it. Rather, most actively discourage it, beginning with Intel's first multiplier-locked Pentium II intended to thwart those who'd sell re-marked processors to unsuspecting customers.

AMD adopted a similar stance in 2000 when it launched the Thunderbird core on Socket A. It didn't take long for enthusiasts to figure out that unlocking the chip's clock multiplier was a matter of connecting bridges on the processor's surface with a conductive pen. And, because each model's speed rating was etched onto the core itself, AMD worried less about the disreputable re-marking crowd. When the Palomino core emerged, mounted on organic packaging material, overclockers discovered pits where the bridges had been cut with a laser. Each pit had to be filled with a nonconductive material before joining the L1 bridges. Unfortunately, AMD has since locked the Barton core completely, limiting overclocking activity except for those willing to try the L5 bridge mod, which transforms an Athlon XP into an Athlon XP-M, with PowerNow! and a variable multiplier.

TI OVERCLOCKING

Do you want to be the coolest person in calculus class? Try overclocking your calculator. Pop the top on your TI-85, desolder the C9 capacitor, and enjoy playing Pong at full speed. It'll also accelerate those sine functions, useful for catching up with the rest of class.

It looks like unsanctioned clock multiplier tweaking has gone the way of phone phreaking, though, as both AMD's Athlon 64 and Intel's P4 are completely locked. Only the Athlon 64 FX allows manipulation; AMD probably feels safe unlocking the more than $700 chips, which aren't likely to be re-marked.

Video Cards Under The Knife

Graphics cards are based on special processors that, like a P4 or Athlon 64, run at clock speeds predetermined by manufacturers to deliver an acceptable balance between performance and stability. It should come as no surprise then that video cards are also commonly overclocked, yielding enhanced gaming performance most noticeable at high resolutions, where graphics demands peak.

Beyond cavalier overclocking, there are also a number of hardware hacks used to transform less expensive models into faster, more feature-complete products. For example, the original GeForce 256 could be hacked into the professional Quadro model by measuring the voltage on pins 18 and 19 of the flash ROM (the pins responsible for the GPU's ID) and moving a pair of resistors that correspond to those two pins, changing the card's ID. The hack is purely informational for most gamers; NVIDIA's Quadro doesn't provide any additional performance except in professional apps and with specially optimized drivers.

INTEL'S PRIVACY FAUX PAS

Early in 1999, Intel revealed that each Pentium III would include a unique PSN (processor serial number). But privacy advocates subsequently launched a boycott and filed complaints with the FTC, after which Intel had to ship its processors with the feature disabled. Today, remaining Pentium III motherboards include a switch to disable Intel's PSN.

A more useful hack emerged when ATI unveiled its R300 architecture, the foundation for the Radeon 9700 Pro. In order to push the chip's power down to mainstream price points, ATI disabled four of its pixel pipelines, applied slower memory modules, and slashed the card's price in half. Imagine the jubilation when it was discovered that certain models would accept a modified driver that unlocked the four unused pipelines. And when it turned out that the Radeon 9500 Pro couldn't be overclocked due to a constraint imposed by ATI, a modified video BIOS emerged (www.3dchipset.com/bios) that lifted the overclocking lock. The resulting gains in performance surmounted the Radeon 9700 and approached the 9700 Pro.

Apparently, ATI didn't learn its lesson (or didn't care) because the Radeon 9800 SE followed, based on R350, and was summarily hacked to enable its four idle pipelines, as well. With a brand-new heatsink to cope with increased thermal output and the specially modified Omega drivers (www.omegadrivers.net/ati/win2k_xp.php) in hand, ATI's Radeon 9800 SE with 256-bit memory worked just like a Radeon 9800 Pro.

Hacking Elsewhere

There are plenty of other components waiting to be hacked. For example, you can use Cygwin (www.cygwin.com), a Linux-like environment for Windows, to install a stripped-down distribution of Linux (www.batbox.org/wrt54g-linux.html) to Linksys' WRT54G wireless router. Why would you want to do that? Because the router is already running its own version of Linux, hacking it enables a host of new options, such as IP traffic monitoring. With some work, it also supports intrusion detection using Snort (www.snort.org). Or, if you own a compliant access point, use the OpenAP software (opensource.instant802.com) to support routing, NAT, DHCP, firewalls, VPN, and bridge 802.11 networks.

Fans of imported DVD movies have a simpler hacking job available: overcome region code limitations of drives manufactured after Jan. 1, 2000 by installing hacked firmware compliant with RPC-1, allowing drives to read discs from any region with an unlimited number of available changes. Visit forum.rpc1.org for more information and a complete list of supported drives.

In Retrospect

In addition to the conventional computer hardware hacks, consumer electronics devices are also proving vulnerable to the hardware hobbyist's wandering mind. Mobile phones, Palm devices, and iPods are all easy targets (who wouldn't want to run Linux on the iPod?). There's also a definite market for hacked game consoles, which usually play back burned media, including backed-up games and DVD movies from multiple regions. Even PVR devices can be hacked from the hardware side to feature larger hard drives and from the software side to interface with computer systems.

NO PEEKING!

Pepsi launched its iTunes giveaway after the Super Bowl, claiming that one in every three bottles was a winner. Or, you could boost your odds by tilting the bottle and looking under the cap without even opening it. Hey, it's not exactly hacking, but it sure made us laugh!

Keep in mind that there aren't any legal ramifications to hacking your hardware, unless otherwise specified (such as the case of circumventing security measures, as prohibited by the DMCA). Once you sink $400 into a Radeon X800 Pro, it's yours to do with as you please, and that includes modding it to run as an X800 XT. You will void your warranty, though, so stick to hacking components that you can live without or easily replace. And if you get banned from Xbox Live for trying to run with a hacked mod chip, don't say we didn't warn you. . . .

by Chris Angelini

For bonus content, subscribers can visit www.cpumag.com/cpusep04/hacktools .

Solder Like A Pro

Gather a soldering station, solder, and a damp cloth or sponge.

Tin the iron's tip with a bit of solder and wipe it off on the cloth.

Hacking hardware is often more involved than overriding a BIOS setting. When physically altering a board-level component, there's no substitute for a soldering iron, which requires lots of practice, a little luck, and a steady hand.

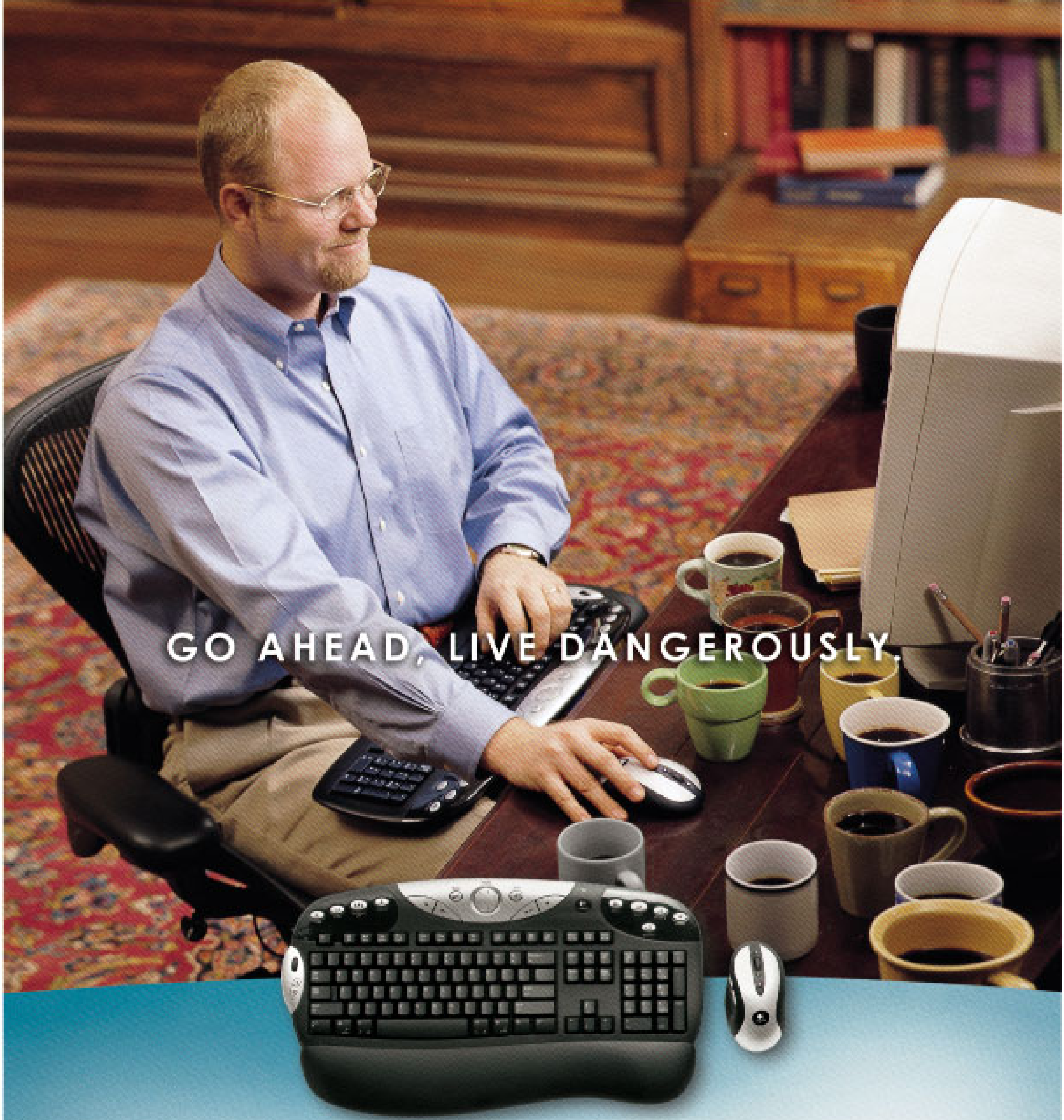
The goal in soldering, say, an SMT component onto a PCB is to ensure a reliable electrical connection that won't fail, potentially causing damage to whatever you're hacking. So arm yourself with the proper equipment: soldering iron and solder. Choose between 15W and 30W to avoid damaging components, and avoid soldering guns, which generally employ higher wattages. For solder itself, rosin core is preferable. And before tackling big projects, practice on spare parts.

Next, ensure the components to be soldered and your equipment are clean. Sand corroded leads with a fine grit sandpaper, if necessary. Next, prepare your soldering iron by tinning it, or applying a thin coat of solder and wiping it off on a damp sponge.

You'll see the best results if the PCB and component you're soldering are at the same temperature. Be careful, though, as tiny SMT pieces are easily ruined if left in direct contact with a soldering tip for too long. Heat the PCB while the component in question indirectly absorbs some of the heat because solder flows and adheres more readily to surfaces with similar temperatures.

After a couple of seconds, the joint should be ready to accept the molten solder. Don't apply solder to the iron's tip. Rather, push a couple of millimeters' worth of solder onto the joint. Be sure it covers adequately, and remove the tip. This shouldn't take more than a few seconds, which is enough time to properly prepare the pad but not enough to damage components.

Should you discover a dry joint (one that formed poorly as a result of grease or dirt), invest in a desoldering pump, which removes molten solder off of a heated joint.



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HACK YOUR HARDWARE

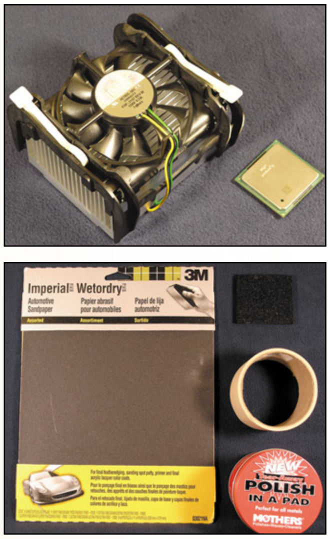
Modding Tips & Tricks For The Hardcore

Computer power users are a resourceful bunch. Whether they want to increase the performance of their rigs, defy the movie studios, or just make their system look better, determined enthusiasts can always find a way to satisfy their needs.

A Smooth Ride To Lower Temperatures

Just about anyone with a screwdriver and a bit of knowledge can piece together a computer system, but not everyone can build a system like a Falcon Mach V or a Voodoo Rage F:2—even if they use the exact same components. These boutique manufacturers pay special attention to every minute detail, making sure that the paint is perfect, every cable is routed and tucked away neatly, and that each component is tweaked for maximum performance. It's this special attention to detail that also separates the plain system that Joe Six-Pack built from one of the insanely modded and tweaked-out rigs that makes people drool at your local LAN party. If you're not quite ready to whip out the rotary tool, spray paint, and Bondo, there are a multitude of smaller projects that detail-oriented enthusiasts undertake that help differentiate their systems from their neighbor's stock rig. These projects can be anything from rounding IDE cables to replacing stock fans.

One of the simplest mods that can yield measurable performance gains is lapping a heatsink and CPU. The performance gains don't come in the form of a higher 3DMark03 score or a faster frame rate in FarCry but rather in lower operating temperatures. And lower temperatures can lead to higher overclocks or increased stability, which are two things that all enthusiasts strive for. Lapping is the process of abrading or sanding a surface to increase its geometrical accuracy and remove blemishes from its finish. Basically, what this means is that any divots and imperfections on the base of a heatsink or on the surface of a CPU's IHS (integrated heat spreader) will be removed by lapping. By doing so, the contact area of the heatsink and CPU is maximized, which facilitates heat transfer. Perfectly lapped and polished heatsinks and CPUs mate more completely, which makes the heatsink perform at an optimal level.

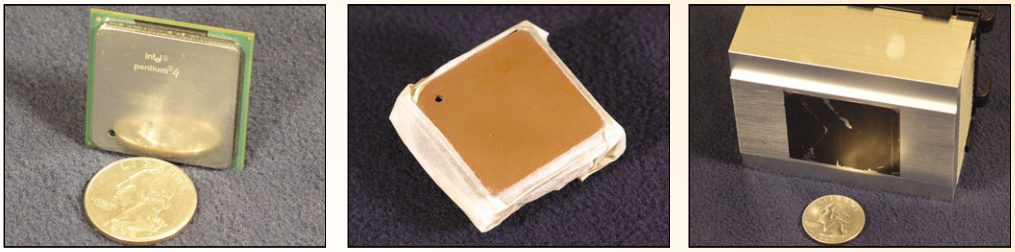


Step 1

There are some risks associated with lapping a heatsink and CPU, however. If you're not careful, too much material can be removed from the heatsink or from the CPU's IHS and they won't mate properly. And if the work is not done on a flat, smooth, level surface, the base of the heatsink or IHS could end up slanted and they won't lay flush when installed in a motherboard. There is also a chance that you'll bend your CPU's pins or soak it with water, so it's incredibly important to take precautionary measures to protect your processor.

1 Unless you routinely do automobile body work and detailing, you'll probably have to pick up some supplies from a local auto parts store to lap your heatsink and CPU. You'll need a few sheets of wet/dry sandpaper of varying grits, metal polish, conductive foam, masking or duct tape, and a bucket of warm soapy water. The sandpaper can usually be found in a multipack. What you should look for are four to five sheets (one each) of 220, 400, 800, and 1,000 grit sandpaper. If you can find 2000 grit, we'd recommend picking up a sheet, as well, but it's not a necessity. The conductive foam can come from just about any electronic product's packaging or from your local RadioShack. For a level and perfectly flat work surface, a sheet of glass or mirror placed atop a large table will work very well.

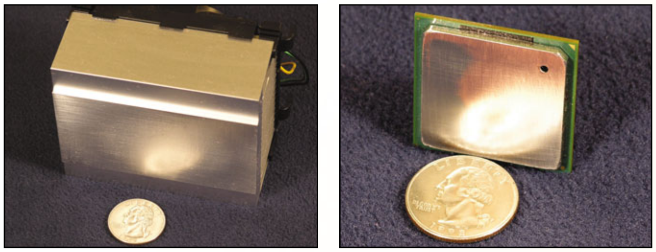
2 The first thing to do before you begin the lapping process is protect your CPU. Push the CPU's pins into the conductive foam, and line the top and underside of the CPU with tape. Only the IHS should be exposed; the entire underside of the CPU should be covered in foam and tape. The goal here is to protect the CPU's pins from bending and to keep the processor itself from getting wet. Then, soak the 220-grit sandpaper in the soapy water for a few seconds. Remove it from the water, place the sheet of sandpaper onto your flat work surface, and begin sanding. You should use very



Step 2

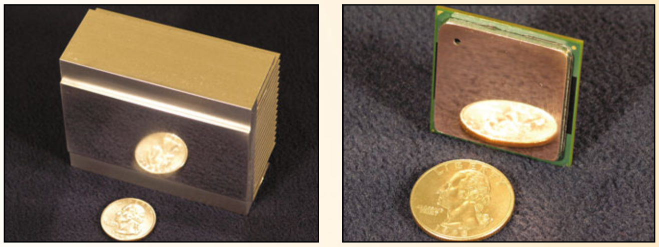
little pressure. Use just enough force to keep the CPU from rocking; it should remain flat and level. Work from one side and push and pull the CPU back and forth in straight lines, not circles. Then turn the CPU 90 degrees and do the same for the next side, until you've completely rotated the CPU 360 degrees; 10 to 15 passes for each side should suffice with the 220 grit sandpaper. The number designates how coarse the paper is (220 grit is rougher than 400 grit and so on), so fewer passes with the coarser grades is best. Follow the same procedure with the heatsink, again using just enough pressure to keep the heatsink flush. Don't push down too hard or you will remove too much material. Let the sandpaper do the work, not your bicep.

3 When you're done with the 220 grit, wipe away any residue from the heatsink and IHS, and soak the 400-grit sandpaper in the soapy water. Then lay the paper flat and repeat the sanding process again for the CPU and heatsink. Even by this early point in the process, by the time you've completed sanding with the 400 grit sandpaper, the base of the heatsink and the CPU's IHS should feel smooth and they should begin to shine. You may also notice that the nickel plating on the IHS has worn away and the solid copper underneath has begun to shine through. With the 400 grit paper, 10 to 15 passes per side should also be adequate. Again, the goal here is to remove imperfections and polish the surfaces, not grind away large amounts of material. Now, clean the heatsink and repeat the process with the 800 grit sandpaper, but this time use about 20 to 25 passes per side. Throughout the entire process, repeatedly inspect the tape and foam protecting the CPU. If any of the protective materials look worn, replace them as necessary.



Step 3

4 Finally, repeat the sanding process with the 1000 grit sandpaper. With this fine paper, use 30 to 40 passes per side to ensure that any larger grooves left over in the surface from the previous sandpaper grades have been smoothed over. Then, completely clean the heatsink and CPU's IHS to prepare them for polishing. Any mildly abrasive metal polish will do; we like Mothers Tear-Away polish or NEVR-DULL. Both of these products consist of chemically treated, wadded fibers. Simply tear away a 2-inch to 3-inch piece and use it to polish the surfaces. To polish, you want to work in circles—not straight lines—and it's OK to use a little elbow grease at this point. Once the surfaces begin to feel smooth, use a clean cloth to buff away the polish. You could even use a small rotary buffer at this stage, but a cloth will work just fine. When you're done, the heatsink and IHS will have a mirror-like finish.



Step 4

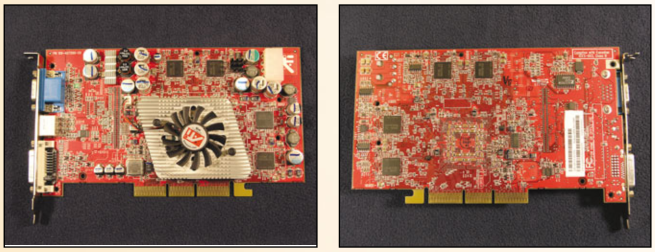
5 Next, you'll need to completely clean the heatsink and CPU. There should be no residue or polish left over on either surface, and they should be completely dry. Once everything is cleaned, use some canned air or blow forcefully through the heatsink's fins and at your CPU's IHS to ensure there is no standing water. It may even make sense to let each item sit for a day or so to make sure they are completely dry. At this point, it's time to prime each surface and reinstall them into your system. Apply a small amount of thermal paste to the base of the heatsink and IHS. Press the paste into each surface and then wipe it away. You'll probably see a light haze; this is the thermal paste filling in any microscopic gaps in the metal. Then, insert your CPU into your motherboard's socket and reapply a very thin layer of thermal paste. Use only enough paste to coat the top of the IHS. Now, reinstall your heatsink and see how you made out.

Before we completed this process, our processor, a 3.2GHz Northwood P4, ran at about 115 degrees Fahrenheit during normal use (gaming, browsing, etc.). After lapping the heatsink and IHS, however, temperatures dropped a few degrees. Now, during the same activities, our processor's temperature usually hovers around 109 F. We'll concede that six degrees is not going to allow you to overclock your processor to new-found heights, but it may be enough to eliminate a few heat-related, random crashes when your system is operating under load.

Breathe New Life Into An Aging Video Card

It's tough to deal with the fact that a brand-new $500 video card will be relegated to the bargain bin in a relatively short period of time. NVIDIA's and ATI's accelerated product cycles mean that your once top-of-the-line video card will be surpassed by a new product in roughly six months. But some of these new products are based on the same core architecture and are simply higher-clocked versions of the previous generation. The NVIDIA GeForce FX 5950 Ultra, for example, is virtually identical to the GeForce FX 5900 Ultra it replaced, except for the 5950's higher clocked core and memory. This means that overclocking a video card is occasionally all that is necessary to bring an older card's performance up to the same level as a faster "refresh" product. You won't be able to take an ATI Radeon 9800 XT that's based on an eight-pipeline R360 core and make it perform like a Radeon X800 XT Platinum Edition that's based on a 16-pipeline R420 core because they are based on different core architectures, but making a Radeon 9800 Pro perform like a 9800 XT is a real possibility.

Installing a program such as Entech's PowerStrip lets users alter their video card's core and memory clock speeds and improve its performance somewhat, but this isn't always enough for the truly hardcore. Just as raising the CPU's voltage will allow for higher overclocked speeds, volt modding a video card will usually allow its core and memory to run at higher speeds than they would normally be able to with the card in its stock form. Volt modding is not for everyone, though. Crank the voltage up too high, and your video card will be rapidly transformed into a paperweight. And you can forget about that warranty. Performing any kind of physical modification will immediately void your warranty. Keep that in mind if you decide to tackle this project. But if you use the right tools, are conservative with the mod, and check your work before applying power, there's no reason you can't enjoy much higher performance without having to shell out a ton of money in the process.



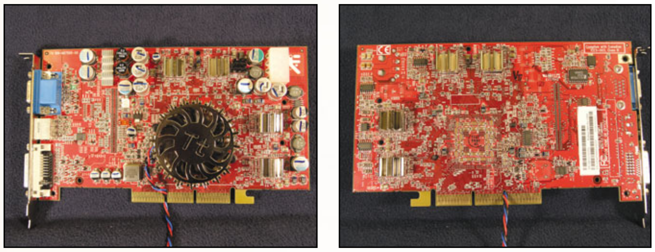
Front and back view of ATI Radeon 9800 Pro video card.

We took a stock ATI Radeon 9800 Pro and decided to see just how fast we could get its core and memory to run by volt modding them both. In its stock form, the Radeon 9800 Pro has a core clock speed of 380MHz with 128MB of memory clocked at 340MHz (680MHz DDR). Without any modifications at all, our card's core overclocked to a respectable 422MHz and its memory peaked at 380MHz (760MHz DDR). When we were done with our mods, however, we hit clock speeds that were much higher. Here's how to do it.

1 Before modifying a Radeon 9800 Pro, you'll have to acquire the parts and tools necessary to complete the process. Two 10K ohm potentiometers (or higher), some thin wire, a bit of 60/40 rosin core solder, and a 25W to 35W soldering iron with a sharp tip are required. You'll also need a good multimeter that can check resistance and voltage, and we'd recommend some double-sided tape to hold the potentiometers in place once the mod is complete, as well. As always, a clean and well-lit workspace is a must.

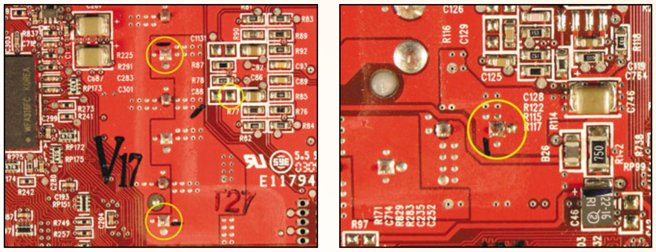
Step 1

2 Anytime you raise the voltage that drives an integrated circuit, the chip will generate more heat. Because we planned to increase the voltages that powered our Radeon 9800 Pro's core and memory, we also decided to enhance the card's cooling. We replaced the stock aluminum heatsink/fan combo with a more powerful tin-coated, copper Crystal Orb and also affixed eight Tweakmonster RAMsinks to the onboard memory chips with some Arctic Silver thermal epoxy. If you're conservative with the voltage increases, enhancing your card's cooling may not be an absolute necessity. The stock cooler is adequate, but to ensure a longer life span and to keep temperatures in check, we took the extra step.



Step 2

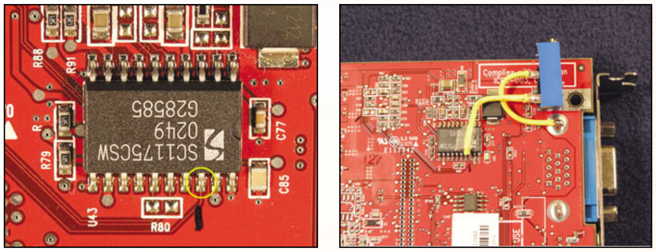
3 Next, you'll need to find the voltage that's already being applied to your card's core and memory (these values will vary somewhat from card to card). As a precaution, at this point we also recommend removing and disconnecting any unnecessary components from your motherboard. Have only the bare essentials needed to power up the system connected—CPU, power supply, memory, and video card. Then,



Step 3

locate the checkpoints highlighted in the images. If you're looking at the backside of the card, with the VGA connectors to your right, the GPU voltage checkpoints will be located about 1 inch away from the upper-rightmost memory chip near the middle of the card. Connect your multimeter's negative probe to a ground point (the case or a black wire in a spare Molex connector will do). Then, touch the positive probe to any of the GPU voltage checkpoints shown and record the value. Next, locate the memory voltage checkpoint. With the card in the same position, start at the upper-leftmost corner and look down 1.5 inches and to the right 1.5 inches. Now touch the positive probe to the memory voltage checkpoint and record that value, as well. Just for reference, our card was running with a GPU core voltage of 1.69V and a memory voltage of 2.94V. (*Note: The ATI Radeon 9800 Pro has gone through a few revisions since its introduction. If your card has a different layout or different components, do not attempt this modification.*)

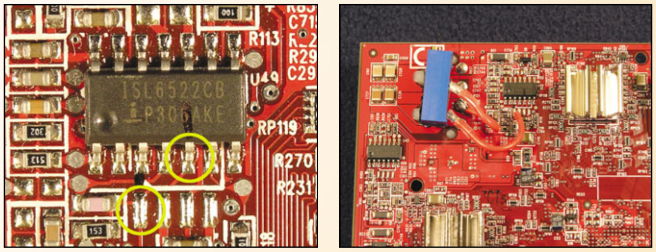
4 Once you've found your card's stock voltages, you're ready to begin the actual modifications. The first step is to check that the potentiometers are set for their maximum values, in our case 10K ohms. This is a very important step. If the potentiometers are set too low, you will immediately fry your card. Connect your multimeter across the potentiometer's leads to check its resistance. (*Note: Some potentiometers have multiple leads. Check resistance across the ground lead and one of the others, and use only those leads when soldering.*) Then, turn the adjustment screw until you reach the potentiometer's maximum value, noting which direction to turn the screw to raise and lower resistance. Repeat this process for both potentiometers. Then, solder some wire to the leads and, when done, double-check that the resistance is still correct. If the resistance isn't correct, turn the potentiometer's adjustment screw as necessary.



Step 4

Next, find the SC1175CSW voltage regulator mounted just behind the DB-15 monitor connector. This is the chip responsible for regulating the voltage that's being supplied to the GPU. By soldering the potentiometer to pin 18 on this regulator, and then to a ground point, the resistance of the overall circuit is changed. The end result is that more voltage will be supplied to the GPU. Solder one of the potentiometer's leads to pin 18, and the other to any available ground point. We chose the large solder point that helps hold the DB-15 connector in place. Make sure that no solder is touching any other pins on the regulator, as this could short the circuit and damage your card. With the potentiometer securely in place, put the video card back in the system and make sure it is still functional. If it is, it's time to recheck how much voltage is being supplied to the GPU. Follow the instructions in step three again to recheck the GPU voltage. Then, you can lower the potentiometer's resistance to increase the voltage being supplied to the GPU or raise the potentiometer's resistance to decrease the voltage. A final voltage that's 3% to 5% higher than the stock number recorded earlier is ideal. Because we also modified the cooling on our Radeon 9800 Pro, we took things a little higher and settled on a core voltage of 1.8V.

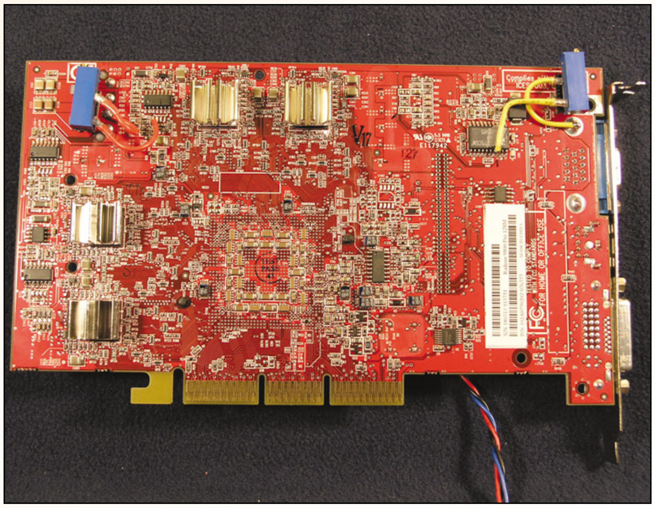
5 With the GPU volt mod complete, we can now move onto the memory volt mod. Remove the video card from your system and find the Intersil ISL6522CB voltage regulator mounted adjacent to the four solder points used in the auxiliary Molex power connector. The second potentiometer needs to then be soldered to either pin 7 of the regulator or to the first of the four blank solder points just below it, and to any available ground point. We chose the ground point that is part of the auxiliary power connector due to its close proximity to the Intersil regulator and the blank solder point below the regulator. Once again, make sure the solder joint is clean and that there is no solder shorting out other pins on the regulator or touching nearby solder points. Then, reinstall the card and follow the instructions in step three to recheck the voltage being supplied to the memory. Again, a voltage that's within 3% to 5% of the original value should be adequate. We brought the voltage on our card up to 3.08V.



Step 5

6 After successfully modding your Radeon 9800 Pro, the last step is to actually overclock the card. As we mentioned earlier, in its stock configuration, our particular card overclocked to 422MHz/380MHz (760MHz DDR) core/memory clock speeds. However, with the volt mods in place, our card's core hit a maximum speed of 460MHz and the memory peaked at a little over 400MHz (800MHz DDR). That's 80MHz (21%) faster than a stock Radeon 9800 Pro core and 60MHz (120MHz DDR), or 18%, faster than the default memory speed.

These higher clock speeds mean our modified Radeon 9800 Pro now has a higher theoretical peak fill rate than a Radeon 9800 XT (3.8Mpps [megapixels per second] vs. 3.3Mpps), and its theoretical peak memory bandwidth has increased to 25.6GBps, a full 2.2GBps higher than a 9800 XT. Not bad, considering the parts necessary to complete the mods cost less than $40, or less than $10 had we not purchased the enhanced cooling hardware, as well.



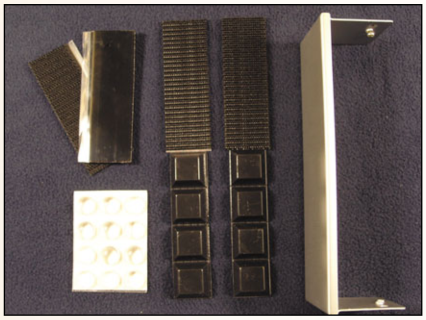
Step 6

Mask That Mismatched Drive

The once-humdrum personal computer has undergone quite a metamorphosis in the last few years. Buying a PC no longer means having a plain, beige box occupying a corner in your office. Today we have exotic SFF systems, home theater PCs, and tower enclosures, and all of them come in multiple shapes and sizes. Unfortunately, optical and floppy drive manufacturers are way behind the curve, which means finding a drive that perfectly matches your case can be difficult. Some specialty resellers have drives available in multiple colors, but they don't carry every brand of drive in every color. Finding precisely what you want can be tough.

So, why not modify your drive and give it a personal touch that just so happens to match your case perfectly? With some strategically placed adhesive and a spare drive bay cover, you can stealth a CD/DVD drive and give your system a clean, custom look.

1 You may already have the supplies necessary to stealth an optical drive somewhere in a junk drawer in your home. If not, all you need are some rubber adhesive cushions and some sort of double-sided adhesive, such as Velcro, Superlock tape, or double-sided foam tape. Of the three adhesives mentioned here, we prefer the Superlock tape (available at RadioShack or any auto parts store) because it is more rigid than Velcro and its glue is more resistant to fluctuations in temperature. You'll also need a spare bay cover from your case.



Step 1

2 To begin the mod, remove the drive from your system and insert a straightened paper clip into the emergency ejection hole to unlock and open the tray and then remove the tray cover. (Most tray covers simply snap into place and can be removed without any tools.) Then, inspect the area around the drive bezel and you should find a few plastic clips holding it in place. Insert a small, flathead screwdriver to dislodge the clips and the drive bezel should slide right off. On some drives, the eject button is completely separate from the bezel, so pay attention when removing it so you don't lose any small parts in the process. The eject button was part of the bezel on our drive.

With the bezel and tray cover removed, the tray itself and the actual eject button are exposed. Take the spare drive bay cover and attach it to the tray so that it becomes the new bezel. The only obstacles to overcome are aligning the cover properly and building up a small section of the cover so it makes contact with the eject switch.

Step 2

Unlock The X800 Pro

Earlier this year, when ATI unveiled its Radeon X800, curious minds observed that the flagship X800 XT Platinum Edition and derivative X800 Pro centered on the same R420 graphics processor. The principle difference between the two was that the X800 XT wielded 16 pixel pipelines, while the X800 Pro packed 12. Naturally, the race was on to see if the Pro's missing pipes could be somehow unlocked.

Sure enough, the enterprising enthusiasts at PC Unleash (www.pcunleash.com), with help from others with X800 Pro ASIC data, discovered that by joining two contact points on the R420's flip chip packaging, flashing the card's BIOS, and installing the latest drivers, it was possible to realize the X800 XT's 16 pipelines and clock speed characteristics.

But the ATI Radeon X800 Pro mod isn't a sure thing, unfortunately. To begin, any attempted modification immediately voids the card's warranty, says ATI's Patricia Mikula, and is consequentially not recommended. There are also reportedly a number of reasons that the modification may not work properly. To begin, according to ATI, some of the 12-pipe boards have faulty quads, meaning one four-pipe cluster has been deliberately disabled due to problems. While such a card might be modded, it could exhibit intermittent stability issues. Or there's the fact that most of the newest X800 Pro boards will not accept the mod. (By the same token, earlier samples are more likely to function with 16 pipes.) Finally, there's a problem with the X800 XT's BIOS looking for a Rage Theater companion chip, not finding it, and entering a perpetual state of crashing and rebooting.

NVIDIA's product strategy differs, as its GeForce 6800 Ultra and 6800 GT cards both sport 16 pixel pipelines, negating any reason to "hard mod" the latter. You can still overclock the GeForce 6800 GT using NVIDIA's Coolbits registry tweak, though, which enables an overclocking tab in the Forceware driver property sheet. There is a 12-pipe GeForce 6800 in the works, but NVIDIA's Brian Burke claims the company is taking measures to prevent any tampering with its NV40 graphics processor to unlock idle pipelines. ▲

by Chris Angelini

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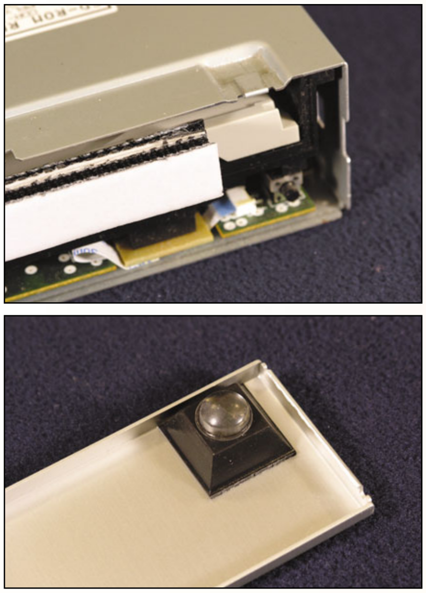
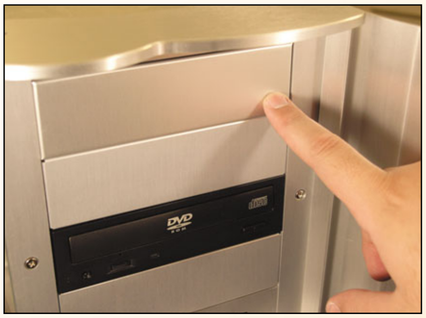
3 The next step is to attach the bay cover to the drive tray to get an idea of how much material to use to fabricate a makeshift eject button. Stick a strip of Superlock tape or Velcro to the drive tray, and lay the drive flat on a table. Then, take the drive bay cover, and while holding it flush against the table, slide it into place against the adhesive on the drive tray, being careful to keep it centered. You have a bit of leeway here, but if you want it to be absolutely centered, tape some flat pieces of cardboard along each side of the drive and use them as guides when you slide the bay cover in place. Once the bay cover is attached, pick up the drive and check the gap between the eject button and cover. With this particular drive, we had about 0.5 inches of space to fill. We then marked the position of the eject button, removed the cover, and used two adhesive rubber feet stacked on top of each other to fill the gap. To get the alignment just right, we had to shave off a few millimeters from one of the feet with a razor blade, but when we were done, everything fit together perfectly.



Step 3

4 We then reattached the bay cover and installed the drive in our system. With the drive closed, it's nearly impossible to tell there is a drive in the bay. Press on the corner of the cover, however, and the tray slides open to the reveal the drive.



Step 4

Circumvent DVD Protection

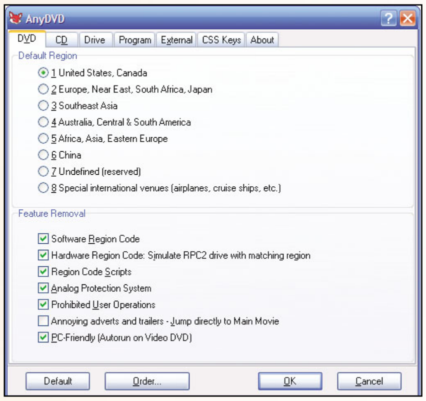
Motion picture studios the world over use region encoding in an effort to control the worldwide release of movies on DVD. This means that encoded DVDs are supposed to be played only in the region that they were sold. Purchase a DVD movie while traveling in Europe, and the odds are that back home in the Unites States, you won't be able to watch it on your standalone DVD player or PC. There are eight regions: Canada, United States, and U.S. territories; Japan, Middle East, South Africa, and Western Europe; East Asia and Southeast Asia; Australia, Caribbean Islands, Central

America, Mexico, New Zealand, Pacific Islands, and South America; Africa, Eastern Europe, India, Mongolia, and North Korea; China; Reserved; and special international venues (airplanes, cruise ships, etc.).

The main reason encoded DVDs won't play on a drive designated for a different region is the RPC (Region Playback Control) feature built into most hardware and software players. RPC restrictions inspect the discs, find the encoded region flags, and write that information to the player. DVD-ROM drives, for example, save the assigned region in a portion of their firmware, and software players store the information in encoded files that can't be easily edited. RPC-2 players, as they are known, must be assigned to only one region and will read movies that correspond to that region alone. And the region can be changed a limited number of times. If a movie is inserted into a locked drive that doesn't match the assigned region, an error message is usually displayed and the drive won't transmit the data required to decrypt the movie. The data that isn't transmitted is the decryption key for the CSS (Contents Scramble System) encryption used on most DVDs. Even the Windows OS itself has built-in support for the initial selection and subsequent changing of the region. WinXP will allow you to change regions only five times before locking.

These security measures can be an annoyance for avid DVD collectors. Music CDs don't have this type of restriction, so why should we be limited to buying and playing movies from only one region? Fortunately, there are few ways that savvy PC users can work around the restrictions. The first is by attaining an RPC-1 player, which is region-free. They simply ignore the region information encoded on the DVD and play the movie regardless. Getting a region-free player doesn't mean you have to purchase new hardware, either. There are Web sites such as The Firmware Page (www.firmware.fr.st) loaded with modified firmware for most commercially available drives. The modified firmware disables the RPCs and will turn a region-locked RPC-2 drive into an RPC-1 drive. However, the story doesn't end there. Even with an RPC-1 drive, you'll need an unlocked software player and the protection built into your operating system will need to be bypassed, as well. The RPCs consist of multiple layers that all need to be circumvented.

A few commercial applications, such as SlySoft's AnyDVD or DVDIdle's DVD Region+CSS Free, have recently been released that make it incredibly easy to sidestep the RPC restrictions. These programs work by adding a software layer between the drivers and the operating system that makes any DVD appear unprotected and region-code free. This gives users the ability to watch a movie encoded for any region in a drive that's assigned to another. They also let users skip past the annoying FBI warnings, advertisements, and trailers found on some DVDs.



Default Region

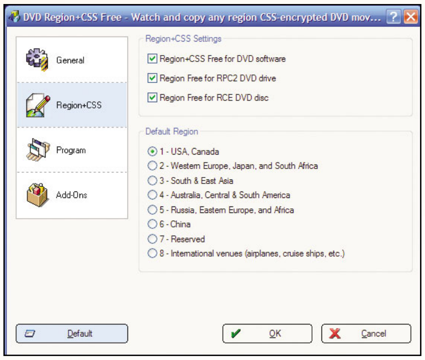
● 1 United States, Canada
○ 2 Europe, Near East, South Africa, Japan
○ 3 Southeast Asia
○ 4 Australia, Central & South America
○ 5 Africa, Asia, Eastern Europe
○ 6 China
○ 7 Undefined (reserved)
○ 8 Special international venues (airplanes, cruise ships, etc.)

Feature Removal

☑ Software Region Code
☑ Hardware Region Code: Simulate RPC2 drive with matching region
☑ Region Code Scripts
☑ Analog Protection System
☑ Prohibited User Operations
☐ Annoying adverts and trailers - Jump directly to Main Movie
☑ PC-Friendly (Autorun on Video DVD)

Slysoft's AnyDVD is a driver that descrambles DVD movies automatically in the background, which makes the DVD appear unprotected and region-code free to all apps.

The movie studios are hip to these circumvention tools, though, and have since begun to employ a few slick countermeasures. On top of the RPC and CSS protection, some studios have introduced smart discs that have an additional embedded code. This RCE (Regional Code Enhancement) builds upon the RPC encoding. It works by detecting whether or not the player is region-specific or if it has been modified in any way to be region-free. If the player is found to be region-free, the RCE protection will instruct the player to not play the movie. Instead, alternate material or a warning message is displayed on-screen alerting the user that the device is not authorized to play the disc.


DVD Region+CSS Free - Watch and copy any region CSS-encrypted DVD mov...
General
Region+CSS
Program
Add-Ons
Default
OK
Cancel

Region+CSS Settings

☑ Region+CSS Free for DVD software
☑ Region Free for RPC2 DVD drive
☑ Region Free for RCE DVD disc

Default Region

● 1 - USA, Canada
○ 2 - Western Europe, Japan, and South Africa
○ 3 - South & East Asia
○ 4 - Australia, Central & South America
○ 5 - Russia, Eastern Europe, and Africa
○ 6 - China
○ 7 - Reserved
○ 8 - International venues (airplanes, cruise ships, etc.)

DVDIdle's DVD Region+CSS Free lets you watch and copy any region code and CSS-encrypted DVD movies on any DVD drive.

There are a multitude of Web sites and information resources dedicated to the RPC, CSS, and RCE protection schemes. When you have some spare time, do a search on Google for any of the terms mentioned earlier, and it'll return a myriad of pertinent results. There are lists of RCE-protected movies, guides that explain how to flash a drive with RPC-1 firmware, community forums, explanations of the technology, and a host of other interesting and useful information. There is even information on how to work around these protection schemes with set-top players. Interestingly enough, all that is necessary to circumvent the protection on some set-top players are a few keystrokes on their remote controls. It seems that some manufacturers don't want to have to deal with these protection schemes and built the circumvention tools right into their players. CPU

by Marco Chiappetta

Hearing is Believing

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2003

revolution 7.1

High-Definition Surround Sound for Your PC

TRUE 24 bit 192 kHz
High Definition

Revolution 7.1

- PCI solution for high-definition surround up to 7.1
- 24-bit/192kHz output up to 8 channels
- Professional 24-bit/96kHz recording
- Real-time stereo-to-surround conversion
- Incredible 107dB SNR provides pristine audio

Sonica Theater

- USB solution for surround up to 7.1
- Up to 24-bit/96kHz audio output
- Professional 24-bit/96kHz recording
- Real-time stereo-to-surround conversion

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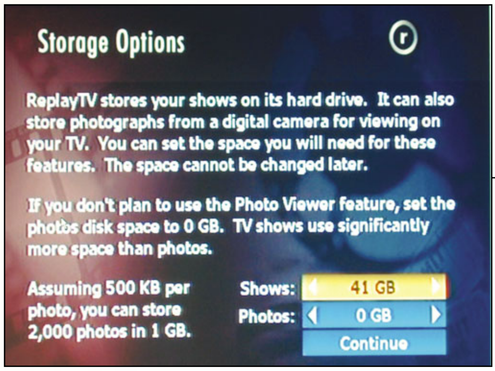
PRY OPEN YOUR PVR

TiVo & ReplayTV Under The Knife

First the ReplayTV. Hats off to the programmers at SourceForge.net for devising a shamefully easy way to hack and upgrade your ReplayTV. Compared to the relative nightmare we endured with our TiVo hack, this was a smooth-sailing dream that took us less than an hour. (If you don't have a PVR but are considering one, head over to PVR Compare, www.pvrcompare.com, which has some excellent comparison information on the two systems.)

Your exact upgrading procedure will vary according to your ReplayTV model and PC configuration, and there are variations for older models, Linux, dual-drive RTV configurations, and so on. To keep things simple and show you how easy this can be, we aimed for the likeliest setup: a late model RTV5504 with a 40GB Maxtor Fireball that we'll upgrade to a 200GB Western Digital Caviar under Windows XP.

The Fireball actually holds about 41GB of data. The default is to allocate 40GB of this to shows and 1GB to photos, but we threw all 41GB behind the video. We then recorded about 90 minutes of "Trading Spaces" (for the wife, of course) and were left with 12 hours and 17 minutes of capacity when recording at high quality. Let's see what stepping up to a 200GB drive can do.


Storage Options

ReplayTV stores your shows on its hard drive. It can also store photographs from a digital camera for viewing on your TV. You can set the space you will need for these features. The space cannot be changed later.

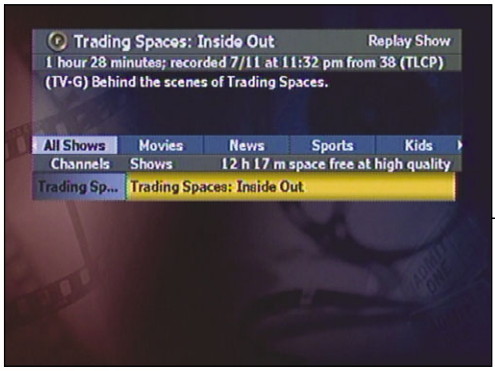
If you don't plan to use the Photo Viewer feature, set the photos disk space to 0 GB. TV shows use significantly more space than photos.

Assuming 500 KB per photo, you can store 2,000 photos in 1 GB.

Shows: 41 GB

Photos: 0 GB

You'll notice the ReplayTV's Fireball drive actually stores 41GB of data.


Trading Spaces: Inside Out

Replay Show

1 hour 28 minutes; recorded 7/11 at 11:32 pm from 38 (TLCP)

(TV-G) Behind the scenes of Trading Spaces.

12 h 17 m space free at high quality

Trading Sp... Trading Spaces: Inside Out

The ReplayTV drive out of the box stores just over 12 hours of video at Best Quality.

Pry the ReplayTV chassis' case off and you will see your unsuspecting prey.

First it's out with the older, smaller drive to make room for our 200GB drive.

Dig In

In essentially every way, the ReplayTV is a friendlier system than TiVo, and that starts with using standard Phillips screws rather than Torx. Once you finish chuckling at the "If Seal Is Broken, Warranty Is Voided" sticker on the back (which you can leave whole and looking new if you're very careful), remove the 10 screws along the chassis' back and sides. The cover lifts away easily to reveal your prey.

The hard drive is secured inside a carrier that's screwed at each corner to standoffs on the chassis floor. (Kudos to ReplayTV for using thick, rubber grommets to dampen drive vibration.) Remove these corner screws, being careful not to lose the black washers left on the grommets and not to touch any of the exposed power supply components. In fact, unplug the power supply and let it sit a minute before you start tinkering. Now lift out the carrier. You can unscrew the drive from its carrier now or later; it makes no difference.

Now, go to sourceforge.net/project/showfiles.php?group_id=17245 and download the RTVPatch utility. There are longer, more difficult ways to do this upgrade in Linux, but the quicker we can do the upgrade, the sooner we can get back to recording shows. If you have Windows 2000 or XP, grab the W2K-RTVPatch. Version 2.4, released Jan. 18, 2003, was current as of this writing. Install this utility on your PC. For easier illustration we threw together a P4 ASUS P4R800-VM system with a 40GB Maxtor drive running Windows XP Pro. With virtually no content on the TiVo source drive, there is only about 500MB of data to handle, so even a small drive will work for backing up.

While it's not essential, we recommend configuring your system so that the ReplayTV source drive is the secondary master while your large target drive is the secondary slave. Your Windows disk is the primary master, although it could just as well be a SATA boot drive.

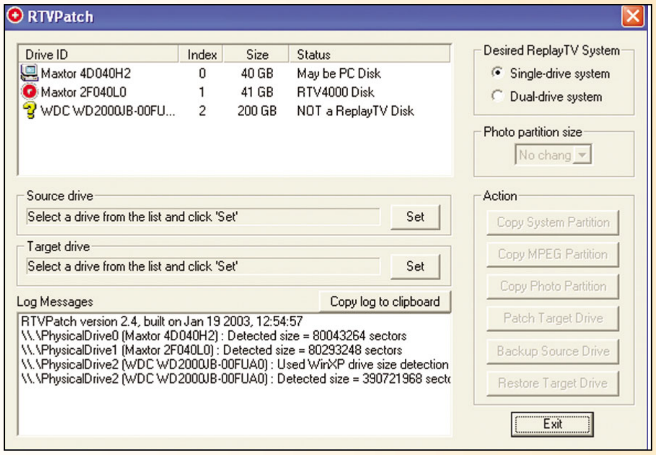
For illustration purposes, we put together this test system on the bench.

Get On The Patch

You should now see all three (or more) drives show up in your configuration during posting. When you're logged in to Win2000/XP with Administrator privileges, bring up the RTVPatch program. You should see something akin to Figure 1 that accompanies this article. The software sees your Windows drive with a status of May Be PC Disk. The ReplayTV drive registers as RTV4000 Disk, even though in our case it is a 5000 series. (There isn't much difference between the two generations for our purposes here.) The large target drive should have a status of Not A ReplayTV Disk and has a yellow question mark to the left of the drive model.

At this point make sure all drives are reporting their proper sizes. If not, stop and exit the RTVPatch. It's likely that your ReplayTV source drive is "locked" and unable to be upgraded. The exception to the size rule is if you are seeing a large drive report such as 137GB. This is symptomatic of running your drives on an IDE controller older than the ATA/100 or ATA/133 specifications. Also, if your new large drive shows as May Be PC Disk, then the drive has an existing PC partition on it that you'll need to eliminate with the Windows Disk Management tool. In the Control Panel, click Administrative Tools, Computer Management, and Disk Management. Right-click the new target drive and select Delete Partition. When this operation completes, go back and confirm that the status in RTVPatch is Not A ReplayTV Disk.

In this example we are selecting Single-Drive System in the top right. The Dual-Drive option will let you keep the original ReplayTV source drive and then add a second drive as additional storage. The trick is that you will need to manipulate or mod your ReplayTV box to accommodate a second drive. Perhaps the easiest solution is to replace the ReplayTV's IDE cable with one that supports two drives, jumper the old drive as master and the new one as slave, put some felt furniture leg pads at each corner of the new drive's underside, and clamp it down with a couple of large zip ties. It won't be pretty, but it's effective if your PVR doesn't travel much.



Drive ID	Index	Size	Status
Maxtor 4D040H2	0	40 GB	May be PC Disk
Maxtor 2F040L0	1	41 GB	RTV4000 Disk
WDC WD2000JB-00FU...	2	200 GB	NOT a ReplayTV Disk

Desired ReplayTV System: ● Single-drive system ○ Dual-drive system

Photo partition size: No chang

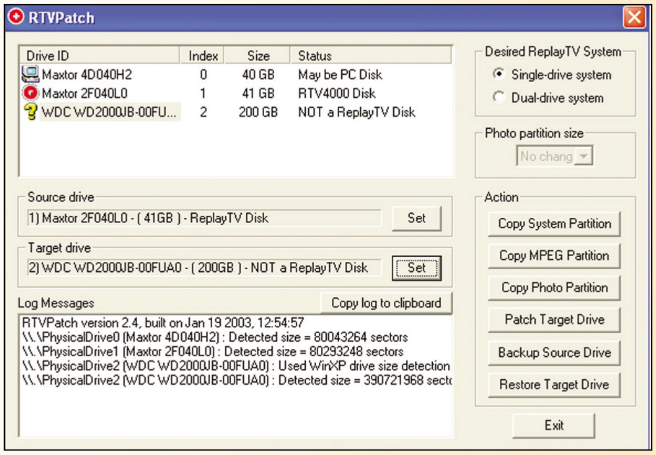
Source drive: Select a drive from the list and click 'Set'

Target drive: Select a drive from the list and click 'Set'

Log Messages

```
RTVPatch version 2.4, built on Jan 19 2003, 12:54:57
\\.\PhysicalDrive0 (Maxtor 4D040H2) : Detected size = 80043264 sectors
\\.\PhysicalDrive1 (Maxtor 2F040L0) : Detected size = 80293248 sectors
\\.\PhysicalDrive2 (WDC WD2000JB-00FUA0) : Used WinXP drive size detection
\\.\PhysicalDrive2 (WDC WD2000JB-00FUA0) : Detected size = 390721968 sectc
```

Figure 1. After starting the RTVPatch program, you should see something display that's similar to this.



Drive ID	Index	Size	Status
Maxtor 4D040H2	0	40 GB	May be PC Disk
Maxtor 2F040L0	1	41 GB	RTV4000 Disk
WDC WD2000JB-00FU...	2	200 GB	NOT a ReplayTV Disk

Desired ReplayTV System: ● Single-drive system ○ Dual-drive system

Photo partition size: No chang

Source drive: 1) Maxtor 2F040L0 - (41GB) - ReplayTV Disk

Target drive: 2) WDC WD2000JB-00FUA0 - (200GB) - NOT a ReplayTV Disk

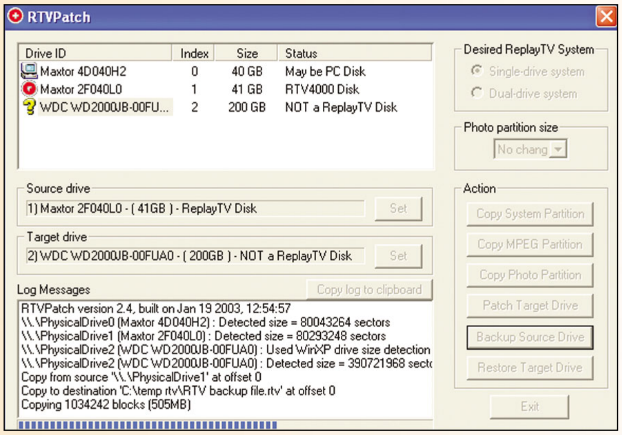
Log Messages

```
RTVPatch version 2.4, built on Jan 19 2003, 12:54:57
\\.\PhysicalDrive0 (Maxtor 4D040H2) : Detected size = 80043264 sectors
\\.\PhysicalDrive1 (Maxtor 2F040L0) : Detected size = 80293248 sectors
\\.\PhysicalDrive2 (WDC WD2000JB-00FUA0) : Used WinXP drive size detection
\\.\PhysicalDrive2 (WDC WD2000JB-00FUA0) : Detected size = 390721968 sectc
```

Figure 2. After highlighting your new drive, you see this.

Next, click the original ReplayTV drive in the drive list and click the Set button next to Source Drive. Highlight your new, large drive and click the Set button next to Target Drive, as shown in Figure 2. You could initiate your backup at this point, but let's make a backup of the source disk first, just in case something goes wrong. (No joke here, people. Our original

TiVo drive died early on in that upgrade process before we could even make a backup.) Click the Backup Source Drive button, browse to a destination folder on your Windows drive, name the backup file, and start the backup. Our backup, including 88 minutes of high-quality video, consumed 505MB.


RTVPatch

Drive ID	Index	Size	Status
Maxtor 4D040H2	0	40 GB	May be PC Disk
Maxtor 2F040L0	1	41 GB	RTV4000 Disk
WDC WD2000JB-00FU...	2	200 GB	NOT a ReplayTV Disk

Source drive: 1) Maxtor 2F040L0 - (41GB) - ReplayTV Disk

Target drive: 2) WDC WD2000JB-00FUA0 - (200GB) - NOT a ReplayTV Disk

Desired ReplayTV System: ● Single-drive system ○ Dual-drive system

Photo partition size: No chang

Log Messages

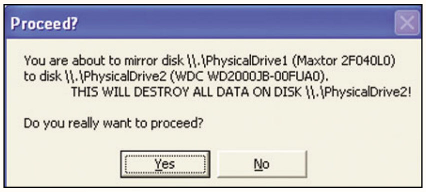
```
RTVPatch version 2.4, built on Jan 19 2003, 12:54:57
\\.\PhysicalDrive0 (Maxtor 4D040H2) : Detected size = 80043264 sectors
\\.\PhysicalDrive1 (Maxtor 2F040L0) : Detected size = 80293248 sectors
\\.\PhysicalDrive2 (WDC WD2000JB-00FUA0) : Used WinXP drive size detection
\\.\PhysicalDrive2 (WDC WD2000JB-00FUA0) : Detected size = 390721968 sect
Copy from source '\\.\PhysicalDrive1' at offset 0
Copy to destination 'C:\temp rtv\RTV backup file.rtv' at offset 0
Copying 1034242 blocks (505MB)
```

Don't mess around here or you could be sorry. Create a backup of the source disk first. We speak from experience.

Now we'll prep the target drive. Use the drop-down menu under Photo Partition Size to either leave the configuration at its present size or pick something bigger. We left the setting at No Change (0GB), but a few gigs might be in order for everyday use. Click the Copy System Partition button. A Proceed? dialog box will ask if you want to destroy all the data on your target disk. Click Yes. All your partition information will transfer over the next minute or two.

Now, press the Patch Target Drive button. Assuming the name offered in the confirmation box matches your new drive, click Yes. After a moment the RTVPatch will display a Reset MPEG Partition dialog box. Select Yes. The box indicates that selecting No may result in not preserving your shows. This may be true, but our "Trading Spaces" episode survived with no problem. Yet another box will ask if you want to reformat the MPEG partition. We selected No, and it worked fine. SourceForge.net indicates that copying videos between drives "is not very reliable," so take your chances.

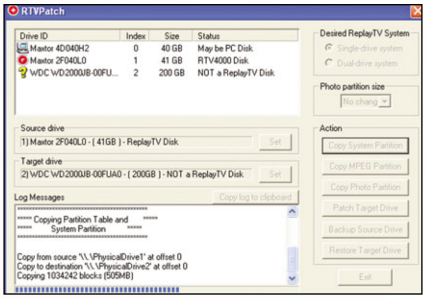
The final question of whether you want to reformat the Photo partition is a safer bet. Just select Yes and wipe it. Thanks to the ReplayTV 5000 series having an Ethernet port, recopying photos back into the PVR from your PC is quick and easy.


Proceed?

You are about to mirror disk \\.\PhysicalDrive1 (Maxtor 2F040L0)
to disk \\.\PhysicalDrive2 (WDC WD2000JB-00FUA0).
THIS WILL DESTROY ALL DATA ON DISK \\.\PhysicalDrive2!

Do you really want to proceed?

You should see this prompt asking if you want to delete the data on your target disk.


RTVPatch

Drive ID	Index	Size	Status
Maxtor 4D040H2	0	40 GB	May be PC Disk
Maxtor 2F040L0	1	41 GB	RTV4000 Disk
WDC WD2000JB-00FU...	2	200 GB	NOT a ReplayTV Disk

Source drive: 1) Maxtor 2F040L0 - (41GB) - ReplayTV Disk

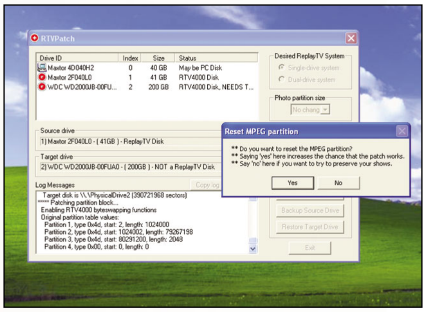
Target drive: 2) WDC WD2000JB-00FUA0 - (200GB) - NOT a ReplayTV Disk

Log Messages

```
******************************************
***** Copying Partition Table and      *****
*****        System Partition         *****
******************************************

Copy from source '\\.\PhysicalDrive1' at offset 0
Copy to destination '\\.\PhysicalDrive2' at offset 0
Copying 1034242 blocks (505MB)
```

Here we were transferring our data to our target drive.


RTVPatch

Drive ID	Index	Size	Status
Maxtor 4D040H2	0	40 GB	May be PC Disk
Maxtor 2F040L0	1	41 GB	RTV4000 Disk
WDC WD2000JB-00FU...	2	200 GB	RTV4000 Disk, NEEDS T...

Source drive: 1) Maxtor 2F040L0 - (41GB) - ReplayTV Disk

Target drive: 2) WDC WD2000JB-00FUA0 - (200GB) - NOT a ReplayTV Disk

Log Messages

```
  Target disk is \\.\PhysicalDrive2 (390721968 sectors)
***** Patching partition block...
  Enabling RTV4000 byteswapping functions
  Original partition table values:
    Partition 1, type 0x4d, start: 2, length: 1024000
    Partition 2, type 0x4d, start: 1024002, length: 79267198
    Partition 3, type 0x4d, start: 80291200, length: 2048
    Partition 4, type 0x00, start: 0, length: 0
```

Reset MPEG partition

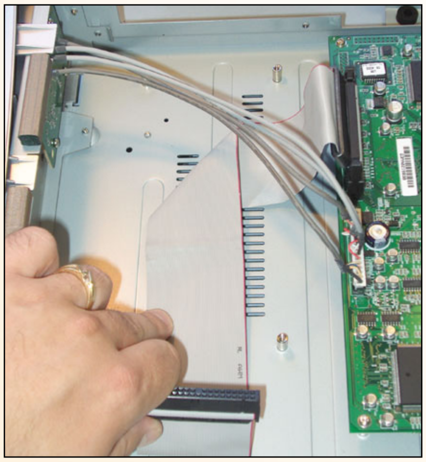
** Do you want to reset the MPEG partition?
** Saying 'yes' here increases the chance that the patch works.
** Say 'no' here if you want to try to preserve your shows.

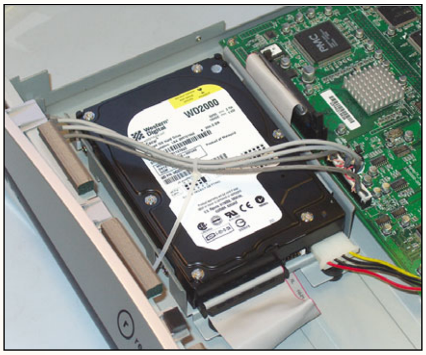
When we were faced with the Resetting The MPEG Partition dialog box, we clicked Yes. All turned out well.

Ready For Prime Time

Now, shut everything down, jumper the new drive back to Cable Select, and install it into the ReplayTV's drive cage. When installing the new drive into the PVR's chassis, note that the factory IDE cable is meant to fold at a 90-degree angle under the hard drive. Secure the cage to the chassis, reconnect the IDE and power cables, and you're ready to roll.

The next time you power up, you'll see ReplayTV's lengthy Please Wait A Few Moments message. When finished, the PVR will power down. Turn it back on, and you should be back in full working order. Sure enough, at the end of our upgrade, we went from 12 hours and 17 minutes of free space to 67 hours and 16 minutes at high quality.


You'll want to fold the IDE cable at a 90-degree angle under the hard drive.


Now it's in with the new drive.

Hacking The TiVo

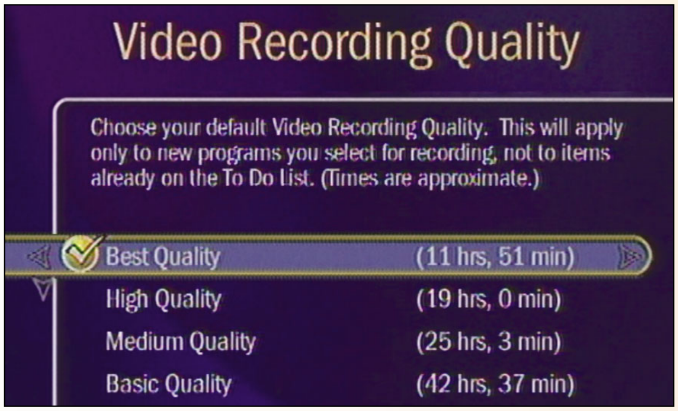
We learned a few things during our TiVo hack, some of which we wish we'd known far earlier in the upgrade process. So before we do anything else, here are three big, fat warnings:

1. Do *not* boot up your TiVo hard drive under Win2000 and XP. Even if the system doesn't try to boot to the drive, these Windows OSes can plant code onto the TiVo drive that will damage its usability.

2. Make sure the drive to which you back up your TiVo image is on a FAT/FAT32 partition and not NTFS. Otherwise, you will not be able to make a source-drive backup.

3. Beware "the white cable of death!" We destroyed (as in permanently rendered unusable) our first TiVo because, while changing out the hard drive, we accidentally dislodged the white ribbon cable running from the IR receiver to the motherboard. The next time we powered up (and forever after), the box wouldn't respond to the remote control. The engineers who designed this clever feature should be manicured with the backside of a motherboard.

We made all of these mistakes, and to add insult to injury, our first TiVo's hard drive died during the upgrade. Plus we were also the lucky recipients of the Unable To Handle Kernel Null Pointer Dereference error, which crashed our system early on in each restore process, thanks to some Linux incompatibility with our ASUS P4R800-VM motherboard, which is based on ATI's 9100 IGP chipset. When we switched out to our trusty ASUS P4C800E-Deluxe (Intel 875 chipset), the problem vanished.



Video Recording Quality

Choose your default Video Recording Quality. This will apply only to new programs you select for recording, not to items already on the To Do List. (Times are approximate.)

✓ Best Quality	(11 hrs, 51 min)
High Quality	(19 hrs, 0 min)
Medium Quality	(25 hrs, 3 min)
Basic Quality	(42 hrs, 37 min)

Out of the box with a 40GB drive, TiVo will record almost 12 hours of video at its highest-quality setting.

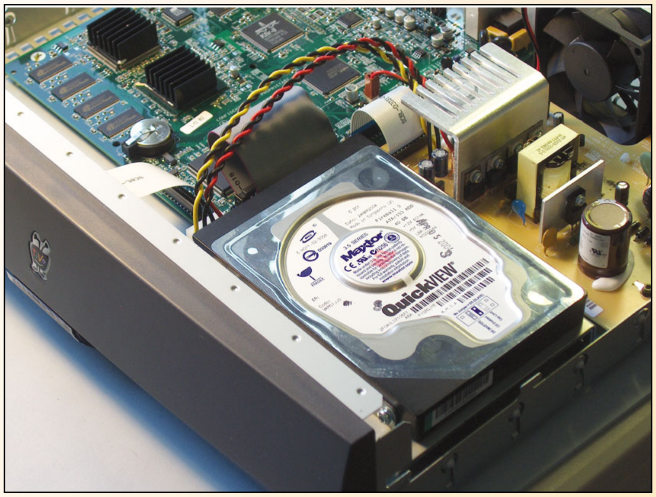
Special thanks to the crew at weaKnees.com, who overnighted us a replacement 40GB drive with an original TiVo image. weaKnees.com is also the purveyor of fine upgraded TiVos, TiVo upgrade kits, and excellent tech support in case the DIY approach seems daunting.

Now, the specific methodology you use for hacking your TiVo will depend on your model and backup/upgrading platform. We purchased a TiVo Series 2 24004A with a 40GB Maxtor Fireball 3 hard drive, the cheapest model that's now on store shelves, which makes it the best value for upgrading. Our objective was to upgrade to a 200GB Western Digital Caviar drive on a bench system running WinXP. Remember that to format our C: volume with FAT32 in WinXP, we had to create a primary partition *less* than 30GB.

On With It

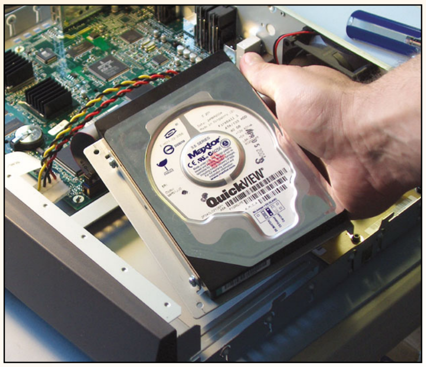
Remove the five screws on the 24004A's back. More thanks go to TiVo for sending us on a special trip to the hardware store for a Torx T-10 screwdriver. While you're there, pick up a Torx T-15, which you'll need for the four screws securing the hard drive into its cage. (Reports vary on the Torx sizes. Everyone agrees a Torx T-10 is needed, but others have described Torx T-15 use in TiVo boxes as random.) We were able to get the cover off with a suitably sized hex wrench and needle-nosed pliers, but nothing got us past the drive screws until the Torx.

With the cover off, carefully unplug the IDE and power cables from the hard drive. Again, be *very* careful not to disturb the white IR cable. Remove the drive from its carrier and jumper it from cable select to master. Jumper your new large drive to slave. Connect both into the secondary IDE channel on your motherboard. Your FAT-based drive is the primary master and your optical drive the primary slave. Don't turn the system on yet.



Meet the victim. You can tell this was our first TiVo box because the white IR cable is disconnected. Oops.

Now go to hellcat.tyger.org/MFS/2.0/mfstools2noJ.iso and download this Linux boot CD image. As with the ReplayTV, you'll need to use Nero or a similar app to burn the file to a bootable CD. There's also a similar Linux bootable floppy file, but because optical drives are in more universal use, we'll stick with the CD. Dip into your BIOS and confirm that the PC is configured to have the optical drive be the first boot device.



Remove the two Torx screws on the left, and the TiVo drive lifts easily from the chassis.

Now power up. The Linux disc will drop you at a prompt. Press ENTER, and more data will load, finally leaving you with a prompt at the screen's top. Use SHIFT-PAGE UP to scroll back up through the boot data. You're looking for a series of lines describing the recognized sizes of your hard drives. In Linux, your primary master will be called hda, the primary slave hdb, the secondary master hdc, and the secondary slave hdd. When you find this section, look closely at the sizes. Our hda (FAT32) and hdc (TiVo source) drives correctly reported at 40GB, but our hdd (200GB) only showed as 137GB. This is actually correct because the kernel only recognizes drives up to this size. (So why did we spend more for a 200GB instead of a 160GB? Good question.) If you see the TiVo drive reporting as 9MB or 10MB, it means that the drive is locked. You'll need to go to www.9thtee.com/qunlock.exe. This executable will permanently unlock your drive.

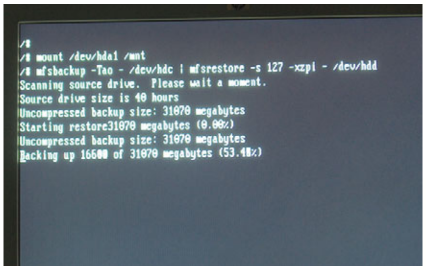
You'll want to configure your old TiVo drive and new, large target drive as master and slave, as we did here on our bench.

Back Up & Restore

This is going to look ridiculously simple, but if you have a configuration problem, this step is where you'll likely encounter it. At the prompt, type **mount/dev/hda1 /mnt**. This mounts the primary partition of your FAT drive. Now type the backup command **mfsbackup -f 9999 -1so /mnt/backup.bak /dev/hdc.** The backup process will last a minute or two and, if you're luckier than us, finish flawlessly on the first attempt.

We should mention that having your large target drive present hasn't been necessary up to this point. If you simply wanted to create a backup of your TiVo drive, you could stop here and reinstall the drive in your PVR. However, if for some reason you didn't install your large target drive before, you need to do it now. This isn't DOS, though. You need to unmount and properly shut down Linux by pressing CTRL-ALT-DELETE. Linux will close down, and then you can power off to add in your drive. If you do this, you'll need to start your next Linux session by remounting the hda1 partition again as noted above.

To restore your TiVo image to the large target drive, type **mfsbackup -Tao - /dev/hdc | mfsrestore -s 127 -xzpi - /dev/hdd.** Note that you make the pipe (|) character by pressing SHIFT-\. If your syntax is right, the restoration will start, and you'll be in for a 30-minute or so wait as the progress counter does its thing.



```
/#
/# mount /dev/hda1 /mnt
/# mfsbackup -Tao - /dev/hdc | mfsrestore -s 127 -xzpi - /dev/hdd
Scanning source drive.  Please wait a moment.
Source drive size is 40 hours
Uncompressed backup size: 31070 megabytes
Starting restore31070 megabytes (0.00%)
Uncompressed backup size: 31070 megabytes
Backing up 16600 of 31070 megabytes (53.48%)
```

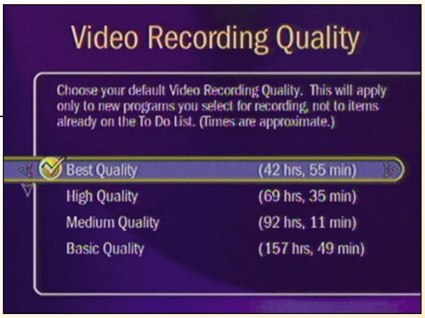
Two little Linux commands are all you need to migrate your TiVo image. Getting to this point can be a challenge, though.

Success!

At long last, we completed our TiVo hack. The restoration was successful, so we powered down and set the new drive's jumper back to cable select. From here it's just a matter of screwing and plugging everything back together—but don't get sloppy and keep an eye on that IR cable.

Our original factory 40GB drive recording at Best quality could record almost 12 hours of video. With our new drive installed, we could nearly hit 43 hours. Ah, sweet Sci Fi Channel marathons, here we come.

by William Van Winkle



Video Recording Quality

Choose your default Video Recording Quality. This will apply only to new programs you select for recording, not to items already on the To Do List. (Times are approximate.)

✓ Best Quality (42 hrs, 55 min)
High Quality (69 hrs, 35 min)
Medium Quality (92 hrs, 11 min)
Basic Quality (157 hrs, 49 min)

Nearly 43 hours of Best Quality storage on a 200GB drive. Now, if they'd only invent a PVR able to filter for Best Quality programming.

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MAKE A BIGGER, BETTER DIGITAL DEVICE

Modify Your MuVo2, Nokia 6800 & Digital Rebel

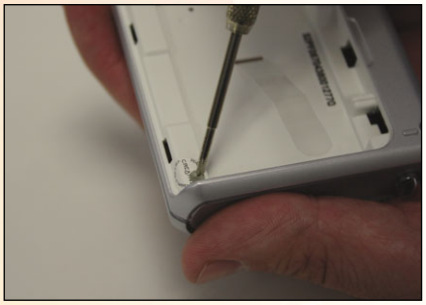
From cameras to phones to MP3 players, there are alterable digital devices to suit every hacker's tastes. We'll start by tearing apart a MuVo2 for its juicy, removable 4GB drive. We'll also free a Nokia cell phone from its service provider-imposed lock and then give our $1,000 Digital Rebel SLR a potent upgrade worth a least a couple hundred bucks. Not bad for two hours of hacking, eh?

Strip Your MuVo2

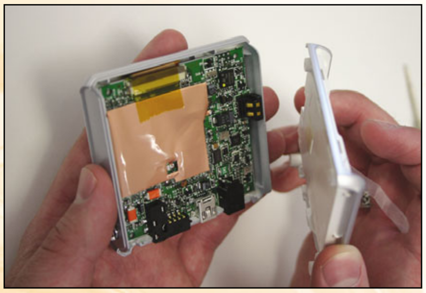
Creative Labs' MuVo2 MP3 player uses a 4GB Hitachi Microdrive, which sells for nearly $500 MSRP itself, in stark contrast to the MuVo2's $200 MSRP. Why not strip out the drive and use it in any CompactFlash Type II card-compatible product, such as your digital camera?

Before you can rip the MuVo2's heart out, you have to find a MuVo2. And because scads of geeks and digicam owners know about this hack, it's unlikely you can simply buy one at Best Buy. An easy way to nab one is to call Creative Labs and get on the waiting list. You'll usually wait a week or two for a return call. You can also try eBay, but prices are typically inflated at least one-third higher than the original retail value

As you look for a MuVo2, you might run into forum exchanges regarding MuVo2s with their drives soldered into place, ostensibly to prevent users from removing them. This is a baseless rumor. Also, if you want to insert a CF card into the MuVo2 so you can have a functional MP3 player, not all CF cards work. If your flash card doesn't do the trick, you can buy a new card (the MuVo2 seems to like SanDisk and Lexar Media cards) or just auction the stripped player on eBay.



Step 3. Getting to the good stuff.



Step 4. Remove the plastic to get to the core.

The Dissection

Disemboweling the MuVo2 isn't terribly complex, but you stand a good chance of rendering useless both the MuVo2's circuit board and the Microdrive if you aren't careful. This is a 15-minute exorcism, but give yourself enough time to do the job right. Here are the steps:

1 Download the MuVo2's firmware from Creative at www.nomadworld.com/downloads/firmware/wma-muvo_2_4.asp. As of press time, the version was 1.11.01. To ensure success we advise using this version. If you buy a MuVo2 that has a lower version, upgrade the device's firmware before you attempt any subsequent steps. Otherwise, you may ruin your chances of successfully hacking the drive.

2 Slide the cover from the back of the MuVo2 and remove the battery. Ground yourself to eliminate the possibility of damaging static discharge.

3 Remove the three visible screws from the MuVo2's case. There's a fourth screw on the case's bottom, but a Warranty Voided warning sticker conceals it. These screws are small and may be hard to remove; some users have reported cracking the plastic case to get them out. Even if you don't plan to reuse your eviscerated MuVo2, the empty (but undamaged) case will sell for a pretty penny on eBay.

4 Carefully lift the plastic panel the screws held in place.

5 With the screws removed, gently flip over the circuit board. If you need to apply force, use a flat screwdriver to carefully pry up the board. You'll see a copper-colored plate that shields the drive.

6 Four screws hold the drive in place, but only three are visible at first glance. Remove these and then gently peel back the black tape concealing the fourth and remove it. Don't completely remove the tape, as it holds a small battery in place.

7 Flip up the shielding plate and expose the Microdrive. Lift the Microdrive and use your flat screwdriver to separate the Microdrive from the pin array.

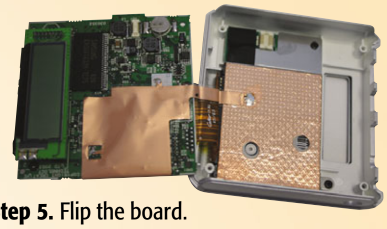
8 If your digital camera accepts CF Type II cards, you should be able to slip the Microdrive into the camera, format it, and immediately begin using your huge drive.

9 If you want to use your MuVo2 with a new CF card, now is the time to do the job. Attach your CF card to the pin array, taking care to properly orient the card. When completely assembled, the card's front label should face the same direction as the front of the MuVo2. If you improperly insert the card, you'll see only "MuVo2" on the LCD when you power the unit up.

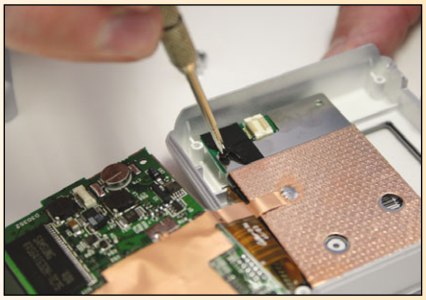
10 Reassemble the player, making sure to smooth down the black tape covering the fourth internal screw.

11 Insert the battery and power up the MuVo2. It will immediately display a "Recover Mode" error message. From the Recovery menu, select Format All, after which you'll see a Media Error message.

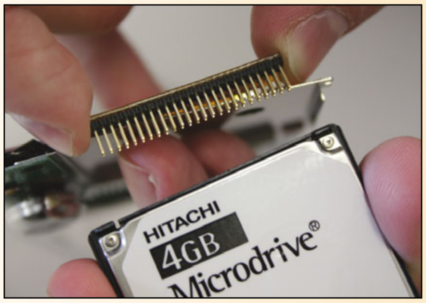
12 Now select Reload Firmware from the MuVo2's menu. Connect the device to your PC using the USB cable and run the firmware you downloaded. You can now use the MuVo2 as an MP3 player again.



Step 5. Flip the board.



Step 6. Remove the eternal screws.



Step 7. The drive is free at last.

The Minidrive Dilemma

Other companies use Microdrives in similar pocket-sized products. Apple, for example, incorporates this drive in its iPod mini. Unlike the MuVo2, however, the iPod's drive won't work with most other devices.

Kim Nguyen, Hitachi Global Storage Technologies corporate communications, says, "Embedded Microdrive products are manufactured to different specifications than standalone Microdrive products. For example, we may lay microcode in the final manufacturing process specific to needs of a particular device manufacturer." There are also other manufacturing and testing variations, but they all mean the same thing: Certain Microdrives simply won't work when detached from their intended products.

Hacking Your Nokia 6800 Cell Phone

If you own a tri-band or quad-band GSM cell phone, you can use just about any digital network in the world. There is one problem: Your service provider locked your phone before you bought it, preventing you from using your phone on a different company's network. You still have the power to unlock it and use it wherever you please, though.

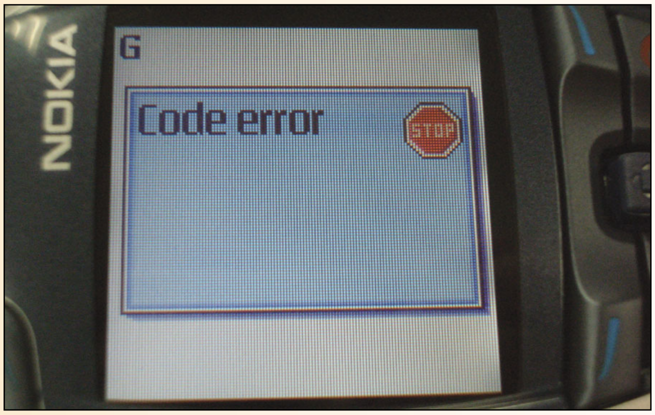
For example, if you take your phone to France and don't want to pay outrageous roaming fees, you can instead buy a much cheaper prepaid SIM (subscriber identity module) card and save big bucks. When your service contract expires, an unlocked phone means you can take your phone to any provider you like.

There are legal issues to consider. If you own your phone, it's legal to unlock it and sign up with another provider. Many users must complete a full one- or two-year contract before they truly own their phones, however, and in some cases the service provider might have a claim to the phone even after this period is over. The only way to be sure you own the phone is to read the contract's fine print or call the provider for more information.

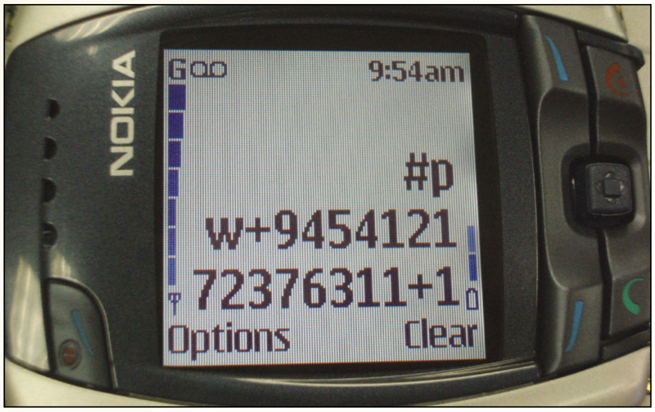
Even if you own your phone, service providers don't want you unlocking it. Mark Siegel, AT&T Wireless' vice president of national brand and marketing media relations, says AT&T "heavily subsidizes" the cost of GSM phones to lure new customers, and if users could switch providers at will, the company's business model wouldn't be economically feasible. Can AT&T even detect if a user unlocks a phone? “The network can detect just about anything,” he says, and AT&T can deal with any phone-related issues it wants to on a case-by-case basis.

Cingular Wireless (at this writing still a separate entity from AT&T) representatives were more forthcoming to our unlocking-related questions. Bob Mack, Cingular marketing manager of devices and accessories, says that unlocking your phone won’t void your warranty and that Cingular’s network can’t detect if previously locked phones have been unlocked.

The point is that it’s unlikely you’ll get into any serious trouble for unlocking your phone, but if you do, don’t blame us. Also, if you call your provider for straight answers, it’s unlikely you’ll get the green light you’re looking for.



Be sure to remember how many errors you encounter. If you accidentally use up your five tries, you’ll be more than a little angry with yourself.



Enter your unlock codes very carefully; you get only five attempts to unlock your cell phone, so make them count.

Cell Hack Attack

It takes just a few minutes to unlock your cell phone, but pay special attention to our tips. Otherwise, these instructions might render your cell phone inoperable. There are several ways to unlock GSM cell phones, but the most common method is to punch in a special code that you can generate free using special software. Don’t pay anyone a dime for access to an unlock code; there are plenty of profiteers on eBay and other Web sites that charge a few bucks for a code, but you can do it yourself and get the code faster.

To start this process, you’ll need assistance in generating a code for your cell phone. You can find this help on such Web sites as Unlocksmith (www.unlocksmith.com) and UnlockMe (www.unlockme.co.uk). For our hack, we used the former site to obtain the free Code Calculator 2.0 utility, which unlocks Nokia DCT4-generation phones, the category our Nokia 6800 fell into.

To use the program, you will need to know your cell phone’s IMEI (International Mobile Equipment Identity) number, which is a 15-digit number that you can find on the label under your cell phone’s battery or by dialing *#06#. You will also need to have the MCC (mobile country code) and MNC (mobile network code) handy. With Code Calculator 2.0, however, you just have to select your service provider and country from drop-down menus, and the program will automatically generate the codes and display them.

Next, you select Type 2 or Type 5 DCT4 Codes. Most Nokia cell phones are Type 2 (unless you use a 3650 or 7650 model, which are Type 5). Now click Calculate, and if you have entered your information correctly, you will see seven potential unlock codes display. According to the application’s instructions, most cell phones will unlock using the first code listed. If that doesn’t work, try code five or code seven.

Before you attempt any codes, remove the SIM card from your cell phone or the codes won’t work. To do this, take out your phone’s battery and slide out the stamp-sized chip that is secured by a retaining clip. Fire up your phone and then enter your code. If you encounter an error, backtrack and make sure you have typed the correct information. You only get five tries to unlock your phone. If you fail, your phone will freeze and you will have to visit your service provider so a technician can use a data cable to make the phone usable again. We punched in the first code on the list. As soon as we pressed the last button, our phone displayed a congratulatory message, “Phone Restriction Off.” We reinserted the SIM card, and the phone worked perfectly.

Your phone can use different SIM cards, and you can use a different service provider’s network. What if you don’t own a Nokia 6800? No problem. Search the messy forums at CellPhoneHacks.com, and you’ll get the scoop on your specific model.

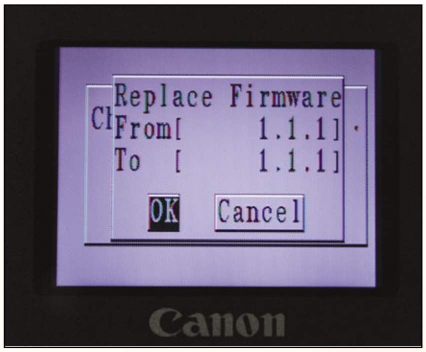
Make Your Rebel Yell

Canon's Digital Rebel is eerily similar to its EOS-10D cousin, which costs $500 more and comes loaded with extras many users appreciate. Thanks to a Russian hacker, you don't have to spend the extra $500 to get some of those.

By installing a hacked version of the Rebel's firmware, you can use features that Canon disabled to better differentiate the Rebel and 10D. Upgraded features include the ability to change file-quality settings with the camera dial (instead of digging through the menu), flash exposure compensation, an option to prevent shutter release after you remove a CF card, and other helpful settings. There is one major downfall to installing the new firmware: It will void your camera's warranty. If you're still mastering your Rebel's plethora of tricks, consider waiting a few months before you add to your already steep learning curve.

To upgrade the camera, you need a copy of the hacked firmware, which you can download at satinfo.narod.ru/en/download.html. You can perform the firmware upgrade with or without the help of a flash card reader. We'll explain the steps for using a reader:

1 Make sure the Rebel's battery is fully charged before you start the upgrade. If the battery is low and the camera shuts off during the firmware transfer, your camera could be disabled, meaning you'd have to send the Rebel in for repairs.



```
Replace Firmware
From[      1.1.1]
To  [      1.1.1]
```

With the FIR file copied to your CF card, you'll see this message when you turn the Rebel on.

2 Format a CF card in the camera.

3 Download the firmware to your PC and extract the files to a new folder. You'll need a copy of WinRAR to decompress the files. One of the extracted files will have the .FIR file name extension.

4 Insert your CF card into your flash card reader and copy the FIR file to the card.

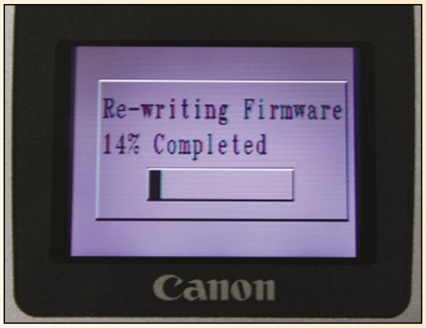
5 Insert the card into your Rebel, turn on the camera, and you'll see the message Execute Upgrade [E3KR111.FIR]. Select OK and press Set. The screen displays Replace Firmware From [1.1.1] To [1.1.1]. Select OK and press Set.

6 The camera will rewrite the firmware and display a status bar. After four minutes, the upgrade should be done. During this time, don't turn off the power, touch any buttons, or open the CF card slot cover. When done, you'll see a Firmware Replaced Successfully message. Press Set, and the firmware is ready.

If you encounter an error, start from the beginning. If you receive an error message, you may need to contact a Canon service center. Don't be afraid to send in your camera, even if you blew your warranty; other users have reported doing so with hacked firmware, yet Canon fixed their Rebels free.

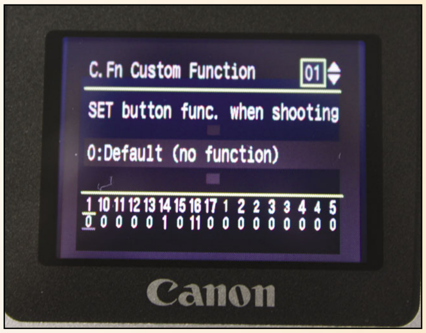
If you want to revert to your camera's original firmware, your warranty is still shot, but you'll have your old Rebel back again. Here's how:

1 Manually reset the values in the Custom Function menu back to the originals. The Custom Function features are numbered in a haphazard fashion. The easiest way to be sure you're resetting the menu properly is to verify the bottom row of digits looks like this: 0,0,0,0,0, 1,0,11,0,0,0,0,0,0,0,0,0. Yes, that eighth number is an 11, not two ones.



```
Re-writing Firmware
14% Completed
```

Hacking your Digital Rebel takes only minutes and frees up numerous useful features. It also voids your warranty.



```
C.Fn Custom Function          01
SET button func. when shooting
0:Default (no function)
1 10 11 12 13 14 15 16 17 1 2 2 3 3 4 4 5
0 0  0  0  0  1  0  11 0  0 0 0 0 0 0 0 0
```

Putting the firmware back to its original version.

2 Download your OEM firmware from Canon at web.canon.jp/Imaging/eosdigital/E3kr_firmware-e.html. Extract the files to a new folder. Now flash your firmware using the same method as with the hacking instructions.

Your camera should now function normally. If the red-eye indicator (on the top right of the Rebel's LCD) is blinking, you didn't properly reset the Custom Functions menu before you flashed back to the original firmware. To fix this, reinstall the hacked firmware, reset the Custom Functions menu, and flash back to the OEM firmware.

Hacked, Over & Out

These few hacks show just how malleable and adaptable your digital toys can be. From minor tricks to substantial upgrades, all you need is basic instructions, simple tools, and a bit of care to twist your technology inside out.

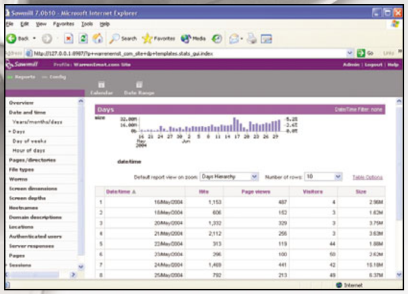
by Nathan Chandler

by Warren Ernst

The Bleeding Edge Of Software

Inside The World Of Betas

Sawmill 7.0b11



Official product name: Sawmill
Version # previewed: 7.0b11
Publisher: Flowerfire
Developer and URL: Flowerfire; www.sawmill.net
ETA: Q3 2004
Why you should care: A good way to gain a different insight of your Web log files.

Web server log analyzers aren't exactly new, but that's no reason why they should all look, feel, and perform about the same. Sawmill 7 is different than the status quo, and getting it running gives you a breadth of statistics many other programs don't seem to offer.

The app's installer installs a background program that acts like a small Web server (and optionally, a database server). You use your browser to access it on port 8987. So, if you set your firewall to allow access to this port remotely, you can access your server stats while on the road. The first time you use the app, it creates various usernames and passwords to ensure some safety, but note that Sawmill doesn't use Secure Sockets.

Once installed, you point Sawmill to your log files, either on the local file system or via FTP or HTTP, and it starts importing the statistics into a database (either its own internal database or MySQL, which is faster). Once imported, the Web interface lets you access the reports, charts, and graphs in a similar way to other Web log analyzers. What's different is that the database is live, and drilling down further into a statistic generates a different picture. Live filtering lets you narrow down almost any statistic, such as the top 10 pathways through your site from the UK on a certain day.

Sawmill's negative is speed. Because the database is live and being actively sorted and filtered as you use it, if your computer isn't fast, there's a measurable delay between clicking a link and reading the results. It took a 2GHz PC 10 seconds to perform some basic operations on a 5MB Apache log file. The beta also failed to work in Windows 98, which is supported. ▲

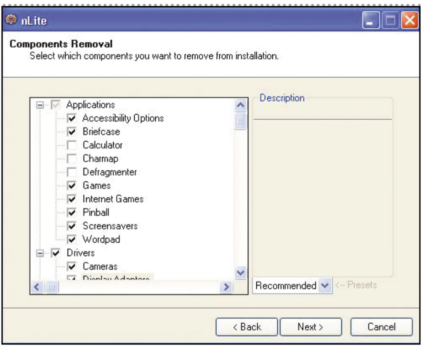
nLite 0.97 beta

It would be great if Microsoft offered various distros of Windows XP/2000/2003 Server. If MS removed Internet Explorer, Outlook Express, and about 100 other features, those distros might be half the size of the standard release, right? It turns out this is possible with nLite.

nLite is basically a Windows distro maker. Point the app at a folder where you've copied the files from your Windows installation CD. Checkmark what you don't want, such as IE, various drivers, Media Player, and more, and let nLite crunch the files to create an ISO image. You can then burn the image to a CD and install your custom Windows distro.

By removing features you never use, you'll save hard drive space, memory, and boot up time. You may also close a lot of security holes because the systems that foster them simply don't exist any longer. You can also fold any service packs and your Windows installation key into the distros, allowing for a very automated Windows installation routine that results in an up-to-date system without an Internet connection.

There are downsides. You could accidentally omit something you need or something you're going to need in the future but don't know about yet. In addition, nLite could make a mistake with something during the cutting, gluing, and packing it performs. On the other hand, nLife can create a version of WinXP that starts in 10 seconds and shuts down in two under VMware. ▲



Components Removal
Select which components you want to remove from installation.

- ☑ Applications
  - ☑ Accessibility Options
  - ☑ Briefcase
  - ☐ Calculator
  - ☐ Charmap
  - ☐ Defragmenter
  - ☑ Games
  - ☑ Internet Games
  - ☑ Pinball
  - ☑ Screensavers
  - ☑ Wordpad
- ☑ Drivers
  - ☑ Cameras

Recommended <-- Presets

Official product name: nLite
Version # previewed: 0.97 beta
Publisher: nuhi
Developer and URL: nuhi; nuhi.msfn.org
ETA: Q3 2004
Why you should care: Rolling your own Windows distribution—what a concept.

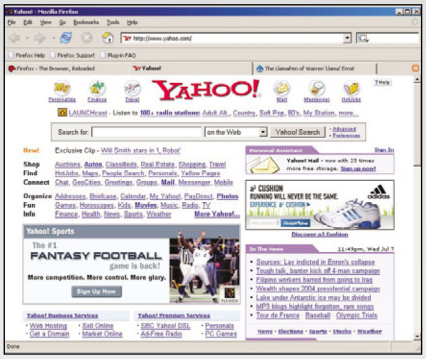
Firefox 0.91 Beta

With computer experts and government officials warning us against using Internet Explorer because of security flaws, locating a suitable alternative browser is getting more important by the day. Into this environment comes Firefox 0.91, an email-clientless browser based on the Mozilla browser and Gecko-rendering technologies. As a browser, Firefox offers more basic features than IE, plus it's expandable and has multiple themes. The $64,000 question is: Can Firefox replace IE? The answer is a definite, "Probably."

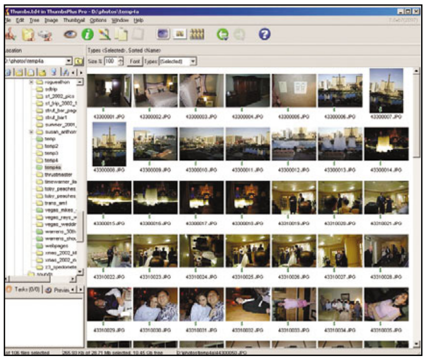
The Mozilla project has generated several programs, the granddaddy of which is Mozilla itself, but its everything-and-the-kitchen-sink approach has led to some leaner, single-purpose programs. Firefox is a browser-only program that most directly compares to IE. There's no email module, no chat program, and no ties to AOL or other Internet services. Like Mozilla, Firefox supports tabbed browsing and themes, letting you browse multiple sites in one window and change the look and feel of the interface.

Feature-wise, Firefox has it over IE. There's a built-in pop-up stopper, a source viewer that color codes tags, and a page printer that doesn't cut off the left margin. The rendering speed of simple and complex pages is comparable to IE, as well. Firefox stays lean because users add features through extensions. Suppose you want Opera-like mouse gestures, a Google toolbar, or a text-attribute stripper when copying and pasting. Just download and auto-install the module and restart Firefox, and it's there.

Exhaustive testing showed Firefox worked well with almost every site we tried, with the exception of those requiring extensive use of ActiveX controls. The Help file is complete, and the program is stable, which bodes well for the eventual 1.0 release. And with that, the elusive alternative browser is found. ▲



Official product name: Firefox
Version # previewed: 0.91 Beta
Publisher: The Mozilla Foundation
Developer and URL: The Mozilla Foundation; www.mozilla.org
ETA: Q3 2004
Why you should care: Perhaps the best alternative browser available, and maybe the best, period.



Official product name: ThumbsPlus Pro
Version # previewed: 7 Pre-Release
Publisher: Cerious Software
Developer and URL: Cerious Software; www.cerious.com
ETA: Q3 2004
Why you should care: A great way to work with hundreds of graphics files.

ThumbsPlus Pro 7 Pre-Release

There are many thumbnail programs for Windows, and WinXP can generate thumbnails itself. But most basic thumbnailers only do pretty much what the name suggests: generate postage stamp-sized images that link to the full-sized photos on your drive. ThumbsPlus, however, does much more.

Version 7 is a major upgrade, starting with its look and feel. The app feels more like a WinXP program, even in Win98, with modern buttons and small icons in the menus. Also, 48-bit color is now supported in many file formats, including TIFF, PNG, RAW, and images loaded with Photoshop plug-ins and scanners (via TWAIN).

Support for these new formats and color depth is important because ThumbsPlus can manipulate and alter files like few thumbnailers can. With a few mouse clicks, you can quickly swap color profiles, swap red and blue, invert colors, remove red-eye, combine two photos, apply color filters, rotate, resize, rename, crop, trim, add borders, cut, copy, paste, and adjust colors, color depth, and color balance. Photoshop users won't likely throw that program away anytime soon, but ThumbsPlus is very useful to those looking to only slightly tweak digital photos.

Ironically, where ThumbsPlus is rather weak is as a basic thumbnailer. While ACDSee let's you blast through thousands of thumb- or full-sized images quickly, this takes much longer with ThumbsPlus. The problem is multiple windows. ACDSee toggles its window between thumbnail and full size and offers lots of keyboard shortcuts to navigate. ThumbsPlus uses multiple windows, plus some important commands require mouse interaction.

The beta wasn't entirely stable, but as the saying goes, "That's what betas are for." ▲

Send Us Your Betas: Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

UP TO SPEED

Upgrades That'll Keep You Humming Along

The summer brought numerous program and driver refreshes, including updates of the Fraps and RightMark benchmarks, the Sandra diagnostic suite, and the PowerStrip and Intel Control Center tweaking tools.

Software Updates

Adobe After Effects 6.5 Professional tryout

This pro-grade video-effects processor for film, digital video, and Web multimedia is now available in a 30-day trial version for Windows and Mac.

Get it at: www.adobe.com

CPU RightMark 3.2

This update of the open-source benchmark supports recent Intel and AMD chipsets and revises the CPU determination routine. A RAM Catalog feature measures RAM bandwidth and latency.

Get it at: cpu.rightmark.org

FileMaker Mobile 7

The version of this database for Palm and Pocket PC lets you synch databases from multiple devices with your desktop, perform file synchs outside of FileMaker, and run scripts before/after synch sessions.

Get it at: www.filemaker.com

Fraps 2.2.3

This version of the video benchmark adds better support for legacy games written for DirectX 7 and earlier, 256-color screen and video grabs, and faster grabbing.

Get it at: www.fraps.com

Intel Desktop Control Center 1.2

For Intel mobo models D925XCV, D925XBC, D915PBL, D875PBZ, and D865PERL, this console drills into system settings to let you diagnose and tweak system cooling, memory timings, performance parameters, and other functions that usually require entering BIOS setup routines.

Get it at: www.intel.com

Mozilla Firefox 0.9.1

Firefox uses tabbed browsing, integrated pop-up blocking, and personal browser themes. This preview release offers a new default that's consistent across all platforms, better migration from other browsers, and a new installer for Linux/GTK2 users.

Get it at: www.mozilla.org

Nero CD-DVD Speed 3.10

This optical-drive benchmark measures transfer rates, CPU usage, burst rate, and other performance aspects. The upgrade improves the disk quality test, fixes bugs, and adds shortcuts for graphics test results.

Get it at: www.cdspeed2000.com

PowerStrip 3.50

The graphics-card tweaking utility now supports the latest NVIDIA GeForce 6800, ATI X800, and DeltaChrome-class cards. This version also supports 64-bit Windows.

Get it at: www.entechtaiwan.com

PlexTools Pro 2.14

This suite of copying tools and diagnostics for Plextor drives gets bug fixes.

Get it at: www.plextor.com

SiSoftware Sandra 2004 SP2

Sandra now supports Intel Xeon processors with 64-bit extensions, Intel PXA27x processors, and DDR2 SDRAM platforms. Support has been enhanced for AMD Geode and Athlon 64 CPUs, the Intel 6300 PIIX, and VIA PM880/PT880 chipsets.

Get it at: www.sisoftware.co.uk

Windows Download.ject Fixes

These critical updates for multiple Windows' versions help plug a hole in IE that can let an outsider control your machine. Reports, however, indicate the fixes don't entirely close the hole.

Get it at: www.microsoft.com

Driver Bay

ATI Multimedia Center 9.1

For ATI's All-In-Wonder family, MC 9.1 resolves many interface anomalies and bugs and fixes several problems with the TV recording scheduler. The EazyShare interface now supports multiple monitors.

Get it at: www.ati.com

Creative Disc Maker/Creative CD Burner 1.00.03

This revision for the CD-burning functionality in Creative PlayCenter and MediaSource software now supports and recognizes a wider range of CD-RW drives.

Get it at: www.creative.com

Logitech Gaming Software 4.40

This support tool for Logitech joysticks, racing wheels, and gamepads lets you map FSP commands to the POVs or D-Pad buttons and map Pause and NUM LOCK command keys to game profiles.

Get it at: www.logitech.com

NVIDIA Display Driver for Linux IA32

Linux IA32 users now get support for the latest GeForce 6800 cards, PCI Express, OpenGL Shading Language, and ACPI. The drivers also fix a problem with AMD64 processors.

Get it at: www.nvidia.com

Realtek Media Player A3.60

These drivers and audio console for motherboards using Realtek AC'97 audio include numerous fixes and customized settings.

Get it at: www.realtek.com.tw

The Codecs 2.1

Recent versions of these compilations of codecs update codecs, add an unattended installation option, and remove the 3ivx codec.

Get it at: www.theorica.net/codecs.htm

by Steve Smith

I Spy A Remover

Apps That Put The Kibosh On Spyware

Download the wrong file or visit the wrong Web site and your system can get hit. Once that happens it can behave erratically with constant interruptions or crashes. In the '80s viruses were one cause. In the '90s worms and Trojan horses were others. Today, adware, also known as spyware, is a primary source.

Typically, spyware plants itself on a computer and spies on Web activities, peppering you with a barrage of ads. Often, spyware gets on your system without your knowledge. You can also install some spyware by downloading and running a phony spyware-removal program. (Spyware Warrior, www.netrn.net/spywareblog, has a list of such suspected apps.) Historically, spyware resisted easy manual removal. Unless you know which files to delete, it can be difficult to uninstall a spyware program. But thanks to a slew of specialized spyware-removal programs, that's changed.

I tested six removers by loading three ad-supported, file-sharing apps (as identified by Download.com)—LimeWire, Kazaa, and Warez P2P—on an AMD Athlon 1700+ system running Windows XP. I also visited an MP3-trading site known to load spyware simply by browsing it (known as "drive-by downloading"). To ensure each program operated under the same parameters, I created a restore point under Roxio's GoBack 3.0, which captured the status of the hard drive at a certain time. After running each app, I returned the computer to the restore point and ran the next program.

I recorded how many spyware files each program found, which can be deceiving. A single spyware program can actually consist of multiple files. So, one remover might count four separate files as a single spyware app, but another might count the four files as four separate apps. For maximum protection, many people use two spyware removers, so if one misses a spyware file, the other will likely catch it.

How Spyware Removal Works

Spyware removers scan every file on your computer, checking them against a database of known spyware files. The most crucial aspect of any program is keeping the database updated. Otherwise, an app could claim your system is spyware-free when it isn't. Because updating the database is critical, better removers automatically check for updates periodically. (Some removers charge a fee for annual database updates.)

Once a program detects spyware, you can delete it right away or move it to a quarantine folder. This is done because you may have an ad-supported program you want, but if you remove a spyware component that app depends on, it won't work. The folder gives you the option of restoring deleted files. Many programs also let you schedule scans of your computer automatically, such as at startup. Scheduling makes scanning effortless so you won't have to remember to run the program yourself.

Aluria Software Spyware Eliminator

If you have AOL 9.0, you're already using a version of Spyware Eliminator, as AOL's Spyware Protection is based on the program. The app's Mac-like interface is easy to understand and provides wizards to guide novices in using the program.

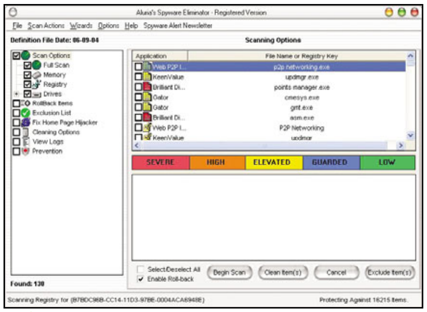
Once the app sweeps your computer clean of spyware, it offers a preventative feature that blocks ActiveX components from loading and stops your browser from visiting Web sites known to secretly install spyware. In some cases, spyware will switch your browser's home page and modify your Registry to make switching your home page address more difficult. Spyware Eliminator can root out such hijacking and let you enter the home page address you want.

To protect your privacy, the program can clean out your Internet Explorer or Netscape cache, the list of Web sites you've recently visited, the list of documents you have recently opened, Clipboard history, and the Recycle Bin. The program also offers the most flexible scheduling features of any app here, letting you specify the days and times to automatically scan for spyware. For true control freaks, the program can even scan for spyware every hour or at a specific time, such as 9:32 p.m.

With its low cost, free updates for the life of the product, and flexible scheduling options, Spyware Eliminator provides all the protection you need to defend against the latest spyware.

LavaSoft Ad-aware 6 Personal

LavaSoft offers three versions of Ad-aware. Ad-aware Plus ($26.95) can block spyware from installing, while Ad-aware Professional ($39.95) is designed for networks. I tested the free version, which does not monitor and block suspected spyware files from installing on your computer. This means you must run Ad-aware periodically. Fortunately, you can configure Ad-aware to run and remove any spyware it finds at every start up.



Definition File Date: 06-09-04

Application	File Name or Registry Key
Web P2P I...	p2p networking.exe
KeenValue	updmgr.exe
Brilliant Di...	points manager.exe
Gator	cmesys.exe
Gator	gmt.exe
Brilliant Di...	asm.exe
Web P2P I...	P2P Networking
KeenValue	updmgr

Found: 130

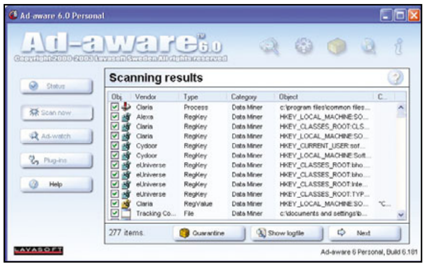
Scanning Registry for {87BDC96B-CC14-11D3-97BE-0004ACA6948E}

Protecting Against 16215 Items.

Spyware Eliminator
$29.99
Aluria Software
www.aluriasoftware.com

Using Ad-aware is simple. Just click the Scan Now button and Ad-aware starts rooting out spyware. Right-click a suspected spyware file and a description of the suspected spyware file displays.

To enhance Ad-aware, free plug-ins are available, including VX2 Cleaner, which removes a particularly nasty spyware file. Messenger-Control can turn off the Windows Messenger Service to block some



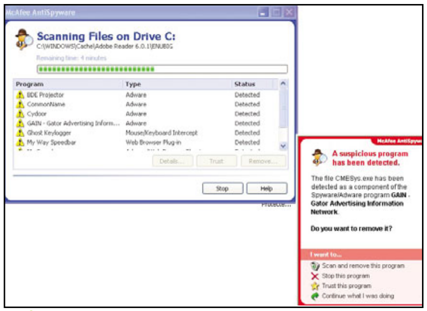
Obj	Vendor	Type	Category	Object	C...
☑	Claria	Process	Data Miner	c:\program files\common files...	
☑	Alexa	RegKey	Data Miner	HKEY_LOCAL_MACHINE:SO...	
☑	Claria	RegKey	Data Miner	HKEY_CLASSES_ROOT:CLS...	
☑	Claria	RegKey	Data Miner	HKEY_LOCAL_MACHINE:SO...	
☑	Cydoor	RegKey	Data Miner	HKEY_CURRENT_USER:sof...	
☑	Cydoor	RegKey	Data Miner	HKEY_LOCAL_MACHINE:Soft...	
☑	eUniverse	RegKey	Data Miner	HKEY_CLASSES_ROOT:bho...	
☑	eUniverse	RegKey	Data Miner	HKEY_CLASSES_ROOT:bho...	
☑	eUniverse	RegKey	Data Miner	HKEY_CLASSES_ROOT:Inte...	
☑	eUniverse	RegKey	Data Miner	HKEY_CLASSES_ROOT:TYP...	
☑	Claria	RegValue	Data Miner	HKEY_LOCAL_MACHINE:SO...	"C...
☑	Tracking Co...	File	Data Miner	c:\documents and settings\b...	

Ad-aware 6 Personal

Free

LavaSoft

www.lavasoft.de


McAfee AntiSpyware
Scanning Files on Drive C:
C:\WINDOWS\Cache\Adobe Reader 6.0.1\ENUBIG
Remaining time: 4 minutes
Details...
Trust
Remove...
Stop
Help
McAfee AntiSpyware
I want to...
Scan and remove this program
Stop this program
Trust this program
Continue what I was doing

Program	Type	Status
BDE Projector	Adware	Detected
CommonName	Adware	Detected
Cydoor	Adware	Detected
GAIN - Gator Advertising Inform...	Adware	Detected
Ghost Keylogger	Mouse/Keyboard Intercept	Detected
My Way Speedbar	Web Browser Plug-in	Detected

A suspicious program has been detected.

The file CMESys.exe has been detected as a component of the Spyware/Adware program **GAIN - Gator Advertising Information Network**.

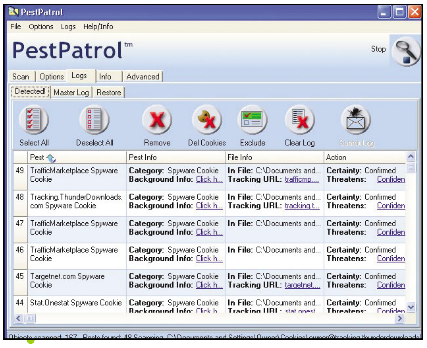
Do you want to remove it?

AntiSpyware

$39.99

McAfee

www.mcafee.com



	Pest	Pest Info	File Info	Action
49	TrafficMarketplace Spyware Cookie	**Category:** Spyware Cookie **Background Info:** Click h...	**In File:** C:\Documents and... **Tracking URL:** trafficmp....	**Certainty:** Confirmed **Threatens:** Confiden
48	Tracking.ThunderDownloads.com Spyware Cookie	**Category:** Spyware Cookie **Background Info:** Click h...	**In File:** C:\Documents and... **Tracking URL:** tracking.t...	**Certainty:** Confirmed **Threatens:** Confiden
47	TrafficMarketplace Spyware Cookie	**Category:** Spyware Cookie **Background Info:** Click h...	**In File:** C:\Documents and...	**Certainty:** Confirmed **Threatens:** Confiden
46	TrafficMarketplace Spyware Cookie	**Category:** Spyware Cookie **Background Info:** Click h...	**In File:** C:\Documents and...	**Certainty:** Confirmed **Threatens:** Confiden
45	Targetnet.com Spyware Cookie	**Category:** Spyware Cookie **Background Info:** Click h...	**In File:** C:\Documents and... **Tracking URL:** targetnet....	**Certainty:** Confirmed **Threatens:** Confiden
44	Stat.Onestat Spyware Cookie	**Category:** Spyware Cookie **Background Info:** Click h	**In File:** C:\Documents and... **Tracking URL:** stat.onest	**Certainty:** Confirmed **Threatens:** Confiden

Objects scanned: 167 Pests found: 48 Scanning: C:\Documents and Settings\Owner\Cookies\owner@tracking.thunderdownloads

PestPatrol

$39.95

PestPatrol

www.pestpatrol.com

pop-up ads. HexDump can let you scan a file for clues about where it came from.

Although Ad-aware doesn't offer as many features as its rivals, the free version did a competent job of detecting and removing spyware from my test system. Unless you upgrade to the paid version, use the free version to clean up any spyware files another program might miss.

McAfee AntiSpyware

AntiSpyware only found eight spyware apps on my test computer, but it actually found eight different types of spyware, which other programs counted as separate spyware files. So, instead of counting three separate Gator programs as three separate spyware files, it counted them as one.

AntiSpyware's sparse UI consists of just text with a tiny Scan Now command. The interface isn't likely to overwhelm novices with its complexity, but it lacks many useful settings, such as letting you define times to scan your computer or specific folders to scan. With AntiSpyware, you can't selectively scan certain folders or drives. You must either scan your entire hard drive or nothing at all.

If AntiSpyware detects spyware trying to run on your computer, it pops up a window that gives you the option of stopping, removing, or ignoring it. Unfortunately, too many novices won't understand what a BDE Projector file might be doing. Without providing a description of each suspected spyware program it detects, AntiSpyware forces users to choose which files to delete or keep, which inevitably means too many people will allow spyware to stay on their computer.

Of the programs I tested, AntiSpyware was the most aggressive in blocking spyware from secretly installing or connecting to the Internet. Although it's one of the few programs that requires an annual subscription update, the program's preventative blocking feature makes the app worth its price.

PestPatrol

PestPatrol not only roots out spyware embedded on your computer, it also finds and removes Trojan horses that can hijack your browser, hostile ActiveX or Java applets, keystroke-logging programs that can unveil passwords you type, and cookies that track your browsing habits. For additional security, you can configure PestPatrol to remove file-sharing programs, which can include third-party spyware.

On my test system, PestPatrol found an astonishing 2,303 problems. Although other removers simply list suspected spyware files, PestPatrol provided a link to the PestPatrol Web site, which contains detailed descriptions of each spyware file it uncovered. Reading the descriptions lead to learning which spyware files were responsible for causing different problems with my system. If you're not content to just detect and remove spyware, PestPatrol also lets you manually select and analyze files on your computer to determine if they're malicious. PestPatrol can also identify stored cookies.

Unlike most programs, the cost of PestPatrol only includes updates for one year. After that, you must pay an annual fee for additional updates. Despite this minor flaw and its relatively high cost, PestPatrol provides a well-rounded defense against spyware. (StompSoft, www.stompsoft.com, sells a licensed PestPatrol version called Spyware X-terminator for $29.99.)

Team Spybot Spybot Search & Destroy 1.3

Spyware often sneaks into your computer via free programs you download. Fortunately, one of the best spyware-removal programs available is also free.

Spybot offers up a simple UI. Just click the program's big Search & Destroy icon, and Spybot roots through your computer, listing all the spyware files it finds. Scrolling through this list, you can select any files you want to keep, just in case Spybot accidentally mistakes a valid file for a spyware file. Once you've identified the files you want to keep, another click of the mouse tells Spybot to remove all the spyware files it has found.

If you're running Windows Me or WinXP, Spybot automatically creates a Restore point before removing suspected spyware. So, if you suddenly find a program isn't working correctly, Spybot can return your computer to the previous condition before you removed the spyware from your hard drive. (Of course, this also restores spyware back to your computer.)

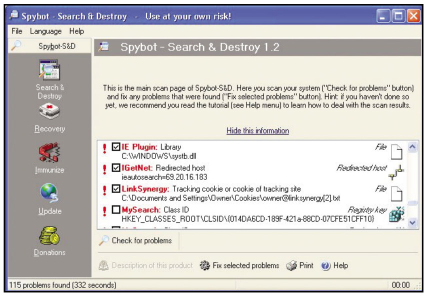
For additional protection Spybot offers an Immunize feature that blocks spyware from loading on your computer. Although

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

The Rundown On Spyware Removers

Spyware is insidious and unfortunately all too prevalent on the Web. Fortunately there are programs available to help get it off your system. We tested six apps. Here is how they size up.

	Aluria Software Spyware Eliminator	LavaSoft Ad-aware 6 Personal	McAfee AntiSpyware	PestPatrol	Team Spybot Spybot Search & Destroy 1.3	WebRoot Spy Sweeper
Spyware files detected	201	53	8	2,303	43	72
Blocks spyware installation	Yes	No	Yes	Yes	Yes	Yes
Automatic or manual updates	Both	Manual	Automatic	Both	Manual	Both
Free updates for the product's life	Yes	Yes	No; annual fee	No; annual fee	Yes	No; annual fee
Scheduling	Yes	Limited; scans at startup only	Limited; scans at every program startup	Limited; scans at startup only	Yes	Yes
Describes spyware files detected	Yes	Yes	No	Yes	No	Yes
Best feature	Free database updates for product's life	Effective and free	Aggressive blocking to prevent secret spyware installation	Descriptive database of spyware files	Effective and doesn't cost you a thing	Numerous spyware-blocking options
Price	$29.99	Free	$39.99	$39.95	Free	$29.95
CPUs	CPU CPU CPU C	CPU CPU CPU	CPU CPU CPU C	CPU CPU CPU C	CPU CPU CPU CPU	CPU CPU CPU C



This is the main scan page of Spybot-S&D. Here you scan your system ("Check for problems" button) and fix any problems that were found ("Fix selected problems" button). Hint: if you haven't done so yet, we recommend you read the tutorial (see Help menu) to learn how to deal with the scan results.

- ☑ **IE Plugin:** Library C:\WINDOWS\systb.dll — *File*
- ☑ **IGetNet:** Redirected host ieautosearch=69.20.16.183 — *Redirected host*
- ☑ **LinkSynergy:** Tracking cookie or cookie of tracking site C:\Documents and Settings\Owner\Cookies\owner@linksynergy[2].txt — *File*
- ☐ **MySearch:** Class ID HKEY_CLASSES_ROOT\CLSID\{014DA6CD-189F-421a-88CD-07CFE51CFF10} — *Registry key*

115 problems found (332 seconds) 00:00

Spybot Search & Destroy 1.3
Free
Team Spybot
www.safer-networking.org
CPU CPU CPU CPU

this immunization can block most spyware, you will still need to run Spybot periodically to remove any spyware that has slipped by Spybot's protection.

With its free price and capabilities, Spybot is a program everyone should download and use.

WebRoot Spy Sweeper

Not only can Spy Sweeper clean your hard drive of spyware files, but it also offers an incredible array of blocking tools to prevent spyware from getting back on your computer again. The program blocks spyware from hijacking your home page, and if spyware does change your home page, the program can automatically switch it back without any intervention from you.

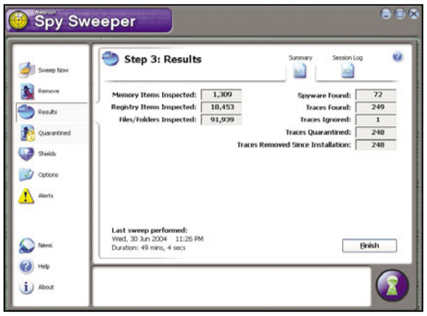
In addition, Spy Sweeper can shut down Windows Messenger service, which is a route that many pop-up ads enter through. For technically savvy users, the program can also display a list of programs that start up automatically so you can see if any spyware files have secretly installed themselves on your computer. You can schedule the program to run at startup or shutdown, at a specific hour, on a specific day, or after a specific number of hours have passed.

With its flexible scheduling options and variety of blocking defenses, Spy Sweeper's only flaw is that you need to purchase an annual update. Otherwise, the program's ability and UI (loaded with easy-to-understand icons) makes a solid app that provides solid protection.

A Final Note

None of these programs were 100% effective. After running each one, another app would find spyware files the previous app missed. This likely occurs because what one app considers spyware, another deems harmless. (See the June, July, and August editions of "The Saint" by Alex St. John for more on the topic.) Also, spyware apps are developed every day, and if a spyware remover's database isn't up-to-date, the remover will miss files.

Many antivirus programs can scan and delete spyware files, but don't rely exclusively on one to protect your system against spyware. AV scanners will only catch the most blatant spyware files while ignoring files that can piggyback on what the antivirus app considers a legitimate file. ▲



Step 3: Results

Memory Items Inspected: 1,309
Registry Items Inspected: 18,453
Files/Folders Inspected: 91,939
Spyware Found: 72
Traces Found: 249
Traces Ignored: 1
Traces Quarantined: 248
Traces Removed Since Installation: 248

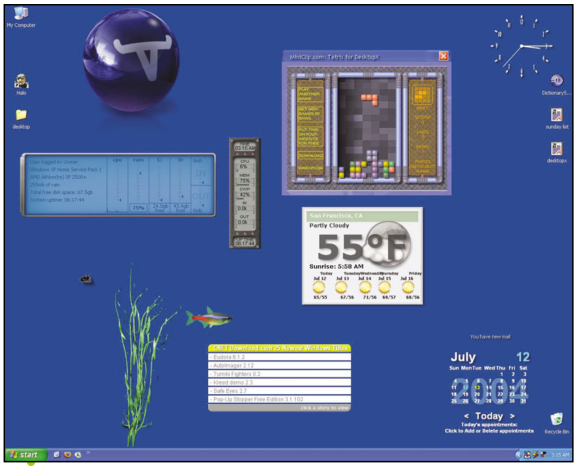
Last sweep performed:
Wed, 30 Jun 2004 11:26 PM
Duration: 49 mins, 4 secs

Spy Sweeper
$29.95
WebRoot
www.webroot.com
CPU CPU CPU C

by Wallace Wang

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Stardock DesktopX 2.1 Enhanced



DesktopX 2.1 Enhanced
- $19.95
- Stardock
- www.stardock.com

CPU CPU CPU

Tools and toys for the PC Desktop are hardly new. Who can forget Neko, the cursor-chasing kitty that's pranced its way from Unix onto every version of Windows? The less fortunate might have scars from experimenting with Active Desktop, Microsoft's crash-prone system for using Internet Explorer 1.0 to bring Internet content to the Windows 95 Desktop. More seasoned readers will remember using TSR utilities to keep PIMS and other tools close at hand back in their DOS days.

Stardock's DesktopX 2.1 brings elements of all these to the Windows Desktop. Like Stardock's popular Windows-skinning tool, WindowBlinds, it's a subset of Object Desktop ($50), a comprehensive customization tool for the Windows GUI. Unlike WindowBlinds, DesktopX doesn't modify the OS kernel; instead, it runs as a process and hosts Objects you choose to load.

While you can build custom Objects directly in DesktopX, there's already a vast array of Objects available for download at WinCustomize .com (though it sometimes seems the majority are clocks, calendars, and CPU monitors). In a vain attempt to slow down my Athlon XP 2500+ system, I buried my Windows XP Desktop under a collection of Objects that included an analog clock, two vastly different IP traffic-CPU-memory meters, a list of the 25 newest Windows titles at Download.com, an excellent Tetris clone, a Desktop Pet (a guppy, if you must know), plus a bit of seaweed that waves in an imaginary current (for the guppy, duh) and a search bar that links to Dictionary.com. I even launched an object that unleashed the Neko kitty on my Desktop. Stardock warns that some Objects or Themes can slow performance, but I didn't run into any problems in my testing.

For folks willing to slog through Stardock's guides to building your own Objects (which isn't a terribly painful prospect), DesktopX's one downfall is that you're stuck at the mercy of other people's quality control. There are some fairly unpolished Objects available for download. Purchasing the $19.95 Enhanced version reduces that risk somewhat, as it opens access to Premium Objects built or vetted by Stardock that won't run on the free version. At worst, you'll be disappointed by something you've downloaded; in almost every case, right-clicking the object and selecting Delete Object killed it off the Desktop.

The most advanced Objects take advantage of scripting. You can build Objects from any language that supports Microsoft's Windows Script Host. Stardock recommends developers stick with VBScript or JavaScript if you want an object to work on anyone's machine, as both come installed with Windows.

DesktopX can also run Themes, which amount to bundles of Objects that can act as a dock full of useful tools, or under Windows 2000/XP, create a more secure Desktop by locking down a laundry list of Windows features, such as right-clicking or CTRL-ALT-DELETE. The result can be a fairly tight kiosk interface or a custom Windows Desktop to restrict a child or employee to a small set of programs.

DesktopX also automatically installs and enables IconX, which offers control over the size of your Desktop icons, along with their behavior when you mouse over them. This might be perfect for making icons properly sized on a massive 1,600 x 1,200 Desktop. (It also loses your original icon layout the first time you run DesktopX.)

Overall, DesktopX was very stable on WinXP, though I had little success running it under Windows 98 or Windows Me. Stable or not, it's good to have the manual on hand. Unload DesktopX is a bit cryptic compared to the Exit or Shut Down most programs offer.

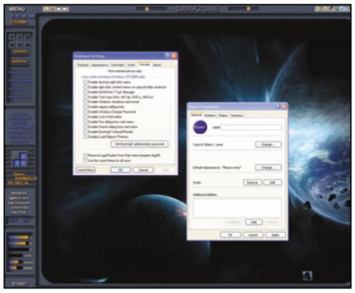
Despite its sometimes-frustrating interface, DesktopX is a powerful tool for adding utilities and toys to the WinXP Desktop. The free version is well worth trying. If it suits you, the Enhanced version is well worth $19.95 for the access to Premium Objects, the ability to export Objects, and removing the nagware screen.

DesktopX requires Win98/Me/2000/XP and at least 128MB of RAM. Stardock suggests no minimum processor, but more complicated Themes and Objects will run better with a faster CPU and more RAM.

(For more on DesktopX 2.1, subscribers can see www.cpumag.com/cpusep09/desktopx.) ▲

by Patrick Norton

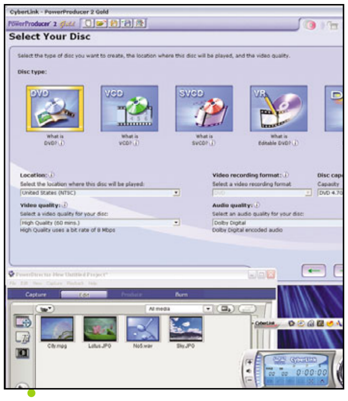
Here is one example of a theme available for DesktopX.



Here are examples of the program's control panels.

CPU Ranking: 0 = Absolutely Worthless CPU CPU CPU 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect by Kevin Savetz

CyberLink DVD Solution



- **DVD Solution**
- Price TBA
- CyberLink
- www.gocyberlink.com

CPU CPU CPU CPU

CyberLink is known for its easy-to-use video-editing and DVD apps. DVD Solution is a bundle of assorted video and DVD software—some old, some new. Alone, many of the programs have received positive reviews. Together they make a potent, well-rounded suite for creating content and burning DVDs.

The package includes two video-editing apps. PowerProducer 2 Gold is aimed at users who want to convert videotapes to digital format, perform basic video editing, and add simple menus before burning those videos to DVD. PowerDirector 3 is for users that want more control over special effects, color adjustment, transitions, and other video-editing features. Both programs lean toward ease-of-use over raw power.

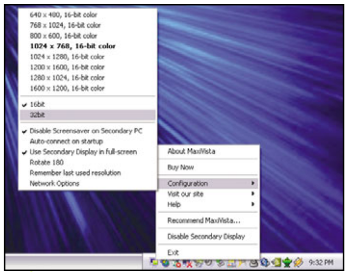
PowerDVD 5 is a DVD player that supports Dolby audio, surround sound, dual subtitles, and other features. There's also Medi@Show for creating and viewing multimedia slideshows and Power2Go for drag-and-drop burning of data, music, and movie CDs and DVDs.

Two new backup utilities are included in the mix, but both have problems. PowerDVD Copy duplicates DVDs. It includes options for customizing the output size and selecting which languages and subtitles to include, but it can't dupe copy-protected DVDs, an understandable but annoying limitation. PowerBackup is supposed to back up data from your PC to CDs or DVDs, but I couldn't get it to work consistently. Some backups failed without a reasonable explanation, and the backup scheduler didn't work at all.

Another new app, PhotoNow, is for fine-tuning digital images. It includes manual and one-click automatic adjustments, but some of its automatic tweaks, such as Auto Balance, were consistently horrible on my digicam images. Also, the program can't do batch conversions, making it useless for manipulating more than one or two pictures at a time.

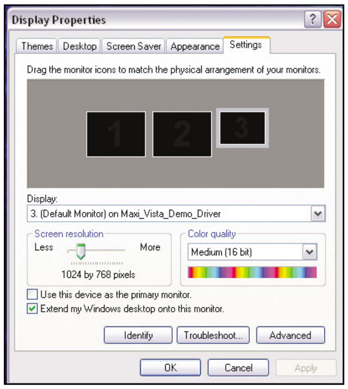
Despite some hiccups, DVD Solution includes some quality tools, with PowerDirector and PowerDVD leading the pack. The package could be very useful to anyone who wants to get more from her DVD burner. Cyberlink plans to offer Silver, Gold, and Platinum suite versions that are expected to cost $39.95 to $249.95. ▲

Bartels Media MaxiVista 1.0.17



- **MaxiVista 1.0.17**
- $49.95
- Bartels Media
- www.maxivista.com

CPU CPU CPU CPU



Drag the monitor icons to match the physical arrangement of your monitors.

Display:
3. (Default Monitor) on Maxi_Vista_Demo_Driver

Screen resolution: Less — More, 1024 by 768 pixels

Color quality: Medium (16 bit)

☐ Use this device as the primary monitor.
☑ Extend my Windows desktop onto this monitor.

Many notebooks include a video-out port that lets you attach an external monitor. With two screens you can enjoy the luxury of a huge Desktop workspace. MaxiVista adds a why-didn't-I-think-of-that corollary feature: It makes your notebook's screen act as a secondary monitor for another PC.

Just put a notebook running MaxiVista's viewer software on your desk. Then, run the server software on your desktop PC. Voila, the notebook acts like a second monitor for the desktop. If there are already two monitors connected to your desktop, the notebook acts as a third. In fact, if your notebook can drive an external monitor, MaxiVista can give you a three- or four-screen configuration. You can also flip the viewer screen's image upside down (useful for using a Tablet PC as the secondary screen) and arrange the relative screen positions using the Display Control Panel.

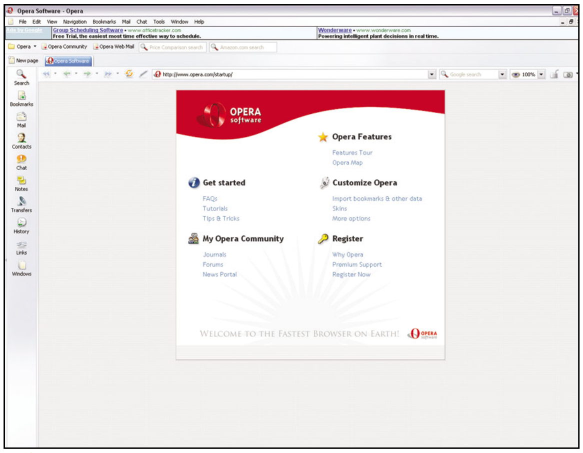
To run MaxiVista, the primary PC needs Windows 2000/2003/XP, while the viewer PC can be running Win98/NT4/Me/2000/2003/XP, which makes MaxiVista a great way to put an older notebook to good use. Both machines need to be connected to your LAN. For now, the program supports only one secondary PC.

The utility doesn't support hardware acceleration on the secondary screen, so it may not work well with fast-moving games. On rare occasions I noticed minor visual glitches when quickly dragging a window, but this was resolved immediately. My only other problem was when the Desktop went idle and returned to the Welcome screen, which caused MaxiVista's connection to the notebook to be lost. Disabling the Welcome screen after the screen saver kicked in resolved the issue.

MaxiVista costs $49.95. A free 30-day trial version is available for download. The program is a smart idea turned into a useful program. If you have a second system lying around, it's an inexpensive and flexible way to add elbowroom to your Windows Desktop without investing in a new monitor and video card. ▲

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Opera Software Opera 7.52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CPU CPU CPU CPU

It's not fair to call **Opera** just a Web browser; it's really a suite that includes **integrated email, a contact manager, an RSS newsreader, and an IRC client.**

It's time to ditch Internet Explorer forever. IE, the Web browser that an estimated 81% of Internet users still use, simply isn't safe. CERT (Computer Emergency Response Team) and the Department of Homeland Security both say its security is woefully lacking. You could go through a myriad of updates to make it somewhat safer, but don't bother—a number of quality alternative browsers are available. Opera (at version 7.52 as of this writing) is among the best.

Thoughtful touches lacking in IE make Opera a joy to use, including tabbed browsing, a pop-up ad blocker, and a skinnable interface. A Zoom feature lets you view a Web page at 20% to 1,000% of its original size, making small print much easier to read. When you launch the program, it can start your browsing session on your home page or a blank page or you can opt to start by continuing with the pages you were viewing during your last session or with a session you've saved. In addition, there's easy, customizable access to your favorite search engines. For example, typing **e laptop** or **r Opera** in the Address bar will search eBay and Google Groups, respectively, for those search terms.

In addition to the standard Back and Forward icons in the toolbar, Opera includes Rewind and Fast-forward buttons. The Rewind button returns you to the page that linked you to the current site (even if that was several clicks ago), and the Fast-forward button zips you to the next page you're likely to browse. For example, if you're reading a long article at an online magazine, the Fast-forward button loads the next page of that article.

The program also supports mouse gestures, which, if you take a few minutes to learn, can speed up your navigation around the Web. Some gestures are rather intuitive, including one in which you hold down the left mouse button while clicking the right to go to the next page. Others have a steeper learning curve. To open a link in a new background tab, move the mouse pointer to that link and while holding down the right button, move the mouse down and then up. With a bit of practice, gestures turn out to be a great tool for power users.

It's not fair to call Opera just a Web browser; it's really a suite that includes integrated email, a contact manager, an RSS newsreader, and an IRC client. (The last two are new in version 7.5.) These features can be handy and occasionally elegant, but some users will prefer to stick with standalone clients, which often provide more thorough feature sets. The email client does include IMAP support and can import email addresses from other apps. The IRC client is passable, with support for file transfers and graphical smileys, but it doesn't challenge any of the better standalone chat clients. Opera claims to support spell checking, but the feature actually requires separate installation of Aspell (aspell.sourceforge.net), an open-source spell checker. The email client does include spam handling that's greatly improved over the previous version.

The Web browser isn't without hitches. Although it works perfectly with most Web sites, a JavaScript menu at www.cpumag.com didn't display at all, and Opera doesn't work with Google's Gmail service. The interface also is sometimes overly complex. For instance, there are three search fields and four versions of the Reload command. First-time users will need to do a bit of setup, including enabling the pop-up blocker (which is disabled by default), decluttering the customizable toolbar, and delousing the overstocked default bookmark list.

Opera is available for Windows, Linux, FreeBSD, Solaris, and Mac OS X. You can pay $39 for the program or opt for the free, ad-supported version. With the free version, you can choose the type of ads you'll see: either relevant textual ads via Google AdWords or a random selection of banner ads.

If you're ready to abandon IE, Opera isn't the only alternative. There's also Firefox, Mozilla, and Maxthon, among others. Opera is a laudable contender in a new generation of browser wars and one that is worth a test drive. It's fast, feature-packed, highly customizable, and more secure than tired, old Internet Explorer. ▲

by Kevin Savetz

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

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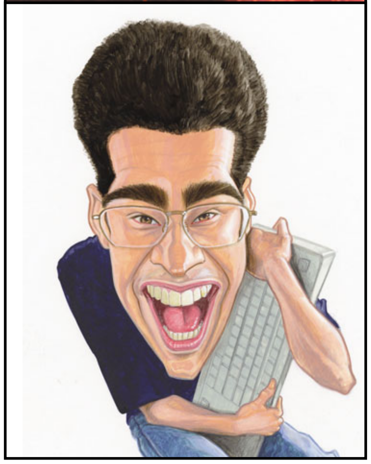
Dialogue Box

by Chris Pirillo

All Quiet On The Browser Front?



Chris Pirillo runs Lockergnome.com, an online tech resource for Windows Fanatics, Linux Fanatics, OS X Fanatics, IT Professionals, Web Developers, Problem Solvers, and Twinkie addicts. Updated every day with Hot Downloads and DVD Deals, it's no wonder this guy never leaves his home office. They've got a Tech News Watch and a dedicated Bargain Hunter channel for the latest discounts and coupons, too. He's a picker, he's a grinner, he's a lover, and he's a sinner. Woo Woo!

Many moons ago I touched upon the browser wars as an embedded journalist. Unfortunately, that digital skirmish is far from over. Microsoft has decided to rekindle the development of Internet Explorer, although it's likely to remain light years behind the competition. Anything it produces is likely to be a classic case of "too little, too late." Even CERT is recommending folks use something else to access the Web.

Countless geeks have already switched to Mozilla, so give it another chance if you haven't already. I would even recommend it to average Joes and Judys, even over Navigator's little brother, Firefox. I've had nothing but praise for recent versions of the primary suite, but I can't say my luck with its consumer counterparts has been anything but mediocre. Seems no matter what I do, Firefox versions have been unstable for me. I just don't think it's all that, but I'm the kind of guy who loves a billion features at my fingertips. At least try an Optimized Firefox Build (www.moox.ws) if you use it. Gimme Mozilla any day.

> **If you're stuck (or happy) with IE, there's only one recommendation I can make: Use Maxthon (formerly MyIE2) instead.**

Opera? It's still kicking. Is it good enough to buy? Depends on what you expect from a suite of Internet utilities, which is what it purports to be. Version 7.5x took much tweaking to get it to look and work to my satisfaction. It does do email, chat, and RSS out of the box. Hallelujah! For over a year, I've been evangelizing this content mechanism. Yes, there are plug-ins for every other Web client, but having this feature working by default? Mandatory.

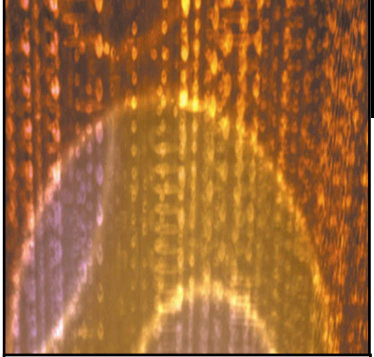
Apple is upping the ante with Tiger's Safari, the next browser for the next OS X revision. It seamlessly supports the viewing of RSS and Atom feeds, and this version appears to let you control the length of content within longer entries. I told you this was going to be big. It was just a matter of time before leading software companies took the bull by its horns. Even Bill Gates caught on to this open "syndication" movement a few months back, which will only help its long-term, cross-platform viability.

If you're stuck (or happy) with IE, there's only one recommendation I can make: Use Maxthon (formerly MyIE2) instead. It's not without quirks, but its benefits far outweigh any visible or invisible drawbacks. I have one very important word for you: tabs. Yes, most IE overlays have sported this feature for years, much like every other modern Web browser. Why Microsoft hasn't incorporated tabbed browsing into an official build is anybody's guess. This window feature (alone) can yield a palpable boost in productivity.

Maxthon is a great way to upgrade without necessarily throwing the baby out with the bathwater. You'll still have access to most (if not all) IE options, plus hundreds of extremely helpful community-built sidebar and toolbar plug-ins: items that'll make it easy to go up a directory, save a Flash file from your cache, correct inherent PNG transparency issues, etc. It also supports popular third-party add-ins like the Google Toolbar and AI RoboForm. And it doesn't cost a thing. I do recommend supporting the cause and dropping a few dimes into the virtual hat.

See, the battle to be your default hyperlink carrier still rages on. There are a lot of exciting developments on the table, and it's far from being controlled by a single entity. When I find time to watch television, I'm taken aback by the ISP commercials I watch. "Spam blocker, pop-up blocker, porn blocker!" Uh, so you're saying I should sign up to access the Internet just so you can block what's not bothering me offline? Yes, the Infobahn is indeed one of the greatest tools the world has ever seen, but getting certain folks to see past the bugaboos seems to be a never-ending task. Perhaps if we started 'em out with a better browser, they'd never see commonplace annoyances in the first place. "And I think to myself . . . what a wonderful world." ■

You can dialogue with Chris at chris@cpumag.com.

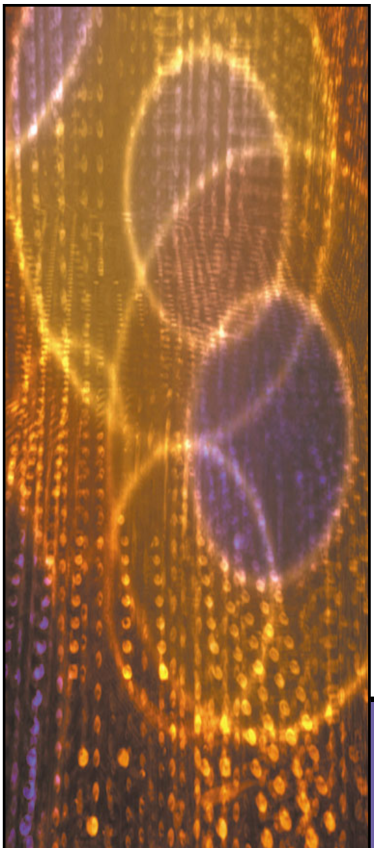


Open Sauce

by Pete Loshin

FUD-a-Palooza

Pete Loshin, former technical editor of software reviews for Byte Magazine *(print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.*



Everyday headlines herald the willingness of new competition-friendly Microsoft to "open" more of its code. With its U.S. antitrust cases all settled and the European Union about to fall in line, as well, Microsofties spent their summer "myth-busting" on tour in Great Britain.

I read the headlines and at first assumed they'd be selling the same FUD about how Microsoft is cheaper, faster, better, and safer than Linux. That's until I saw Microsoft's "Get The Facts On Windows And Linux" (www.microsoft.com/mscorp/facts) and read the whitepapers. Though full of typical FUD lines like, "Windows Users Have Fewer Vulnerabilities," Microsoft's billions can't convince its consultants to ignore reality.

> Microsoft's billions can't convince its consultants to ignore reality.

For example, consider, "Linux is the technical equivalent of Unix and Windows Server 2003" ("Linux, Unix, And Windows TCO Comparison, Part 1," The Yankee Group, April 2004). Forrester reported for companies it interviewed, ". . . software costs for Linux proved to be less expensive, on a per-server basis, than Windows by at least 60%" ("The Costs And Risks Of Open Source," April 12, 2004).

The Yankee Group reported 5% of survey respondents planned, "a total migration from Windows to Linux," while 15% would add Linux desktops but keep existing Windows desktops, and another 21% would migrate a portion of their Windows desktop systems to Linux. Oddly, this data came from a pie chart titled, "Linux Doesn't Dent Windows Desktops"; I'd call it more than a dent. Forrester concludes, "[o]pen source can provide great benefits" to companies that "cover the bases before deploying," while The Yankee Group sums up, "[w]ith proper planning, training, and budgeting, any one of [Linux, Windows, or Unix] can provide the best TCO and fastest ROI."

What about security? Forrester's "Is Linux More Secure Than Windows?" (March 19, 2004) lasers in on two easily quantifiable aspects of security: reported security vulnerabilities and time between discovery and distribution of a fix. Microsoft nails the honors for fewest total security flaws, but that's likely because the researchers counted separately the vulnerabilities for each Linux distro hardware release, as well as counting vulnerabilities discovered in application software packaged with those distros.

Worse, most Windows flaws (86 out of 128) were "high severity." No mention was made of the possibility that Microsoft didn't report flaws discovered internally, and Forrester's recommendations for fast updates, installation ease, or maximum security include Microsoft and one or two of the Linux distros. In other words, Linux and Windows offer equivalent security. Even so, the Yankee Group noted (page 18, "Linux, Unix, And Windows TCO Comparison, Part 1"), "An infecting worm or virus will do far more damage to Windows . . . in a much shorter time than the nastiest Linux bug."

If these reports with such transparent biases are the best Redmond can come up with to counter the threat of Linux, then things are looking up for the good guys.

Playing Around, Part II

Two months ago I promised to return with a look at open-source tools available for creating your own games. Here's a quick selection:

- **Allegro (alleg.sourceforge.net).** A cross-platform, portable library for video game and multimedia programs running on *nix, Windows, Mac OS X, and other OSes; also the basis for the Adventure Game Studio. The community Allegro.cc Web site (www.allegro.cc) offers a good place to start for help or inspiration.
- **Adventure Game Studio (adventuregamestudio.co.uk).** For adventure games like early '90s Sierra and LucasArts adventures. AGS includes a development environment and run-time engine.
- **GameKit (www.cs.brown.edu/people/morgan/gamekit).** GameKit is a C-like language designed to lure youngsters into exploring programming. Code for Space Invaders implementations takes only about 100 lines, and the download includes other sample programs.
- **Mark Hughes Game Design (kuoi.asui.uidaho.edu/~kamikaze/GameDesign).** Programmer Mark Hughes wrote GameScroll for playing and writing interactive fiction; Hephaestus, a Java RPG creation/playing environment; and Delver, a simpler Java-based RPG construction kit. ■

Get saucy with Pete at pete@cpumag.com.

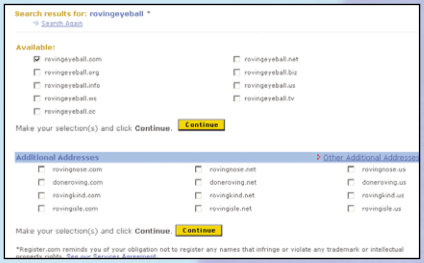
Get Your Domain On The Web . . . Now

Shop For A URL & Reliable Host

With thousands of small Web sites out there dedicated to one of our favorite obsessions, personal computing, you may feel like the only PC fanatic left without a URL. In fact, for those who have shied away from starting a Web site, rest assured that getting your domain up and running isn't that involved. It simply requires the PC and Web connection you already have, some Web-design software, a domain name of your own, and a Web host. Well, maybe not that easy. According to Dean Barker, Webmaster of the popular OverclockerCafe.com, "We've probably gone through 10 different Web hosts in four years, and half have been really fantastic and half have not." Finding reliable Web hosting and domain registry services can be daunting and risky because the field is filled with over-hyped offers and fly-by-night companies that come, go, and sometimes take your Web site with them. So we asked the people who should know, such as experienced Webmasters, ISP executives, and designers, what a PC enthusiast needs to look for—and look out for—in order to get on the Web.

Make A Name For Yourself

The first thing you need is a domain name, that unique address users type into their browsers to navigate to your site. Actually, browsers and sites really find one another on the Internet via unique numerical IP addresses such as 207.153.159.5, but the DNS system lets us associate these IP addresses with alphanumeric names. The system is administered by ICAAN (Internet Corporation for Assigned Names and Numbers; www.icann.org), and domain registrars such as Register.com (see the "Tips For Finding A Domain Registry" sidebar) help you find and secure a domain in the Internet's directory of addresses.



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Make your selection(s) and click **Continue.** Continue

Additional Addresses — Other Additional Addresses
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☐ rovingnose.us
☐ doneroving.us
☐ rovingkind.us
☐ rovingisle.us

Make your selection(s) and click **Continue.** Continue

*Register.com reminds you of your obligation not to register any names that infringe or violate any trademark or intellectual property rights. See our Services Agreement.

A good domain registry such as Register.com will let you try a name with various suffixes (for example, .biz and .us) and slight variations on the name itself in order to find an unregistered URL.

Many Web hosts include free domain registration (see the "Web Hosts Compared" sidebar), which can streamline the later part of the process, associating your domain name with the host. Because you register domains for one, two, or more years at a time, they'll require renewal. Keeping hosting and domain registration with one provider simplifies billing and remembering to renew. However, many prefer to keep registration and hosting separate because they want to reserve a URL before choosing a host or they anticipate switching hosts at some point. As Barker recalls, a PC enthusiast site such as OverclockerCafe.com can grow so big, so fast, it might have to switch hosts.

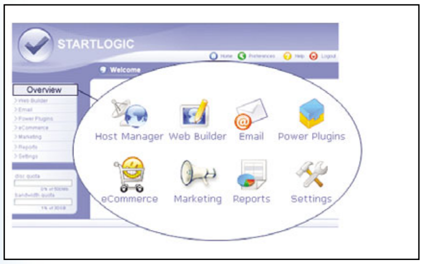
Like hosting, prices for domain registration vary, but expect to pay between $15 and $30 a year or less with multiyear contracts. You'll also need to provide personal and contact information, which will be public. In order to resolve technical issues and conflicts, contact info for all registered domains is available to anyone through the Whois service, accessible through Internic.com. A good registrar will have a Web-based console that lets you log in to your domain information and keep this information up-to-date. We registered a new URL with APlus (www.aplus.net). It submitted the URL to the Internet's central registry and it appeared in Whois the next day. When you secure a hosting service for your site, you will need to go back to this registrar to associate your domain name with the servers at your hosting service.

Is He A Good Host?

The next step is finding a reliable host that meets your needs. First, decide what sort of site you want: the features you want to include (forums, shopping cart, etc.), the size it needs to be in terms of Web pages, and how many visitors you expect. These answers help determine the host and hosting plan you need.

Most PC enthusiasts will likely want to post product reviews and images of their projects, which can take up a lot of disk space on your host's servers. One way to determine the needed disk space is to create sample pages in a design program and calculate the totals for the number of pages you have in mind. To roughly calculate the monthly bandwidth you will need, multiply that total by the number of page views you expect. David Karlins, author of "Build Your Own Web Site," suggests that 5MB of disk space is sufficient for most small sites, and 500MB can hold a medium-sized commercial site. For hobbyists, the 50MB to 500MB server space we found in most of the hosting plans is enough for starters.

As a point of reference, Barker's 4-year-old OverclockerCafe.com has over 4,000 pages and about 2 million page views a month. This equals about 1.2GB of



A good hosting company will provide a user-friendly control center to manage site updates, create email accounts, add in gadgets such as guest books, and even build a site in your browser.

bandwidth a month, says Barker, off of 1.25GB in disk space. In his first year, he had 100,000 page views a month using 15GB of bandwidth. PC enthusiast sites need fresh content to appeal to viewers, and they want that content archived, so expect your disk space needs to grow steadily and quickly, says Barker. When calculating bandwidth, also consider whether you will have forums, which can be very popular and thus spike your bandwidth usage 20% or more, Barker warns.

Many of the hosting companies' online directories take money from vendors to run ads or get preferred placement in the directories, so be aware they are not wholly independent. Alex Lehkas, VP of corporate communication at

Web Hosts Compared

There are literally tens of thousands of Web hosts available. The sample here reflects a range of hosting companies that users and independent reviewers have rated well over the years. Consult each company for its full suite of hosting plans, as we have selected only the more basic plans available for getting most small PC enthusiast sites started.*

Host Name/Address	Basic Plan Price: Monthly/Annually	Available Bandwidth	Disk Space	Email Accounts	Software Support	Domain Registry	Support
1&1; www.1and1.com	$4.99/month (Home Package)	5GB	500MB	50	FrontPage, CGI	One free with package	24/7 phone and email support
123CheapHosting; www.123cheaphosting.com	$5.94/month (SuperValue) $71.24/year	1GB	50MB	10	FrontPage, CGI, Perl, PHP, and more	$20/year	24/7 email support
APlus.net; www.aplus.net	$9.95/month	45GB	1.1GB	400	FrontPage, Perl, PHP, CGI-BIN, MySQL, and more	One free with package	24/7 email support, knowledge base
ApolloHosting; www.apollohosting.com	$8.96/month (Starter Package quarterly contract) $95.52/year	8GB	200MB	10	CGI-BIN, Perl, PHP, MySQL, and more	$15/year	24/7 live chat support, call back, toll-free phone support during business hours, knowledge base
Cedant; www.cedant.com	$12.95/month (Standard Package)	10GB	100MB	25	FrontPage, CGI-BIN, PHP, and more	$29.90/ two years	24/7 email support, business hours phone support
EarthLink; www.earthlink.com	$19.95/month	10GB	200MB	30	FrontPage, CGI scripts, PHP, and more	$40/ two years	24/7 toll-free phone support, online chat and email
iPowerWeb; www.ipowerweb.com	$9.95/month; $95.40/year (Prepaid)	40GB	800MB	400	FrontPage, Perl, CGI-BIN, PHP, and more	One free with hosting, $5.50 each additional domain	24/7 toll-free phone support, online help chat, extensive knowledge base
ReadyHosting; www.readyhosting.com	$99/year	Unlimited	500MB	Unlimited	FrontPage, CGI, Perl, PHP, and more	Free with hosting	24/7 toll-free phone support
SimpleHost; www.simplehost.com	$7.50/month	40GB	Unlimited	Unlimited	FrontPage, Perl, CGI -BIN, PHP, and more	Free with one-year contract	24/7 online support, business hours phone support
StartLogic; www.startlogic.com	$7.50/month	40GB	1GB	Unlimited	FrontPage, CGI-BIN, Perl, PHP, and more	Free with hosting	24/7 toll-free phone support, email support,

* Plans and pricing as of July 5, 2004.

VeriHost (www.verihost.com), recommends TopHosts.com as a reliable place to start. Also CNET (www.cnet.com) has a hosting area with independent reviews. *Web Host Magazine* (www.webhostmagazine.com) claims an independent review panel that evaluates service and performance. You can also look for sites approved by VeriHost, which certifies the legitimacy of hosting companies and their claims.

Be sure to screen hosts for quality and appropriateness. Anyone can make a fancy marketing site, so don't rely on looks, warns Lekas. At the site, look for trademark and copyright dates or press releases that indicate a company's longevity, he advises. "Twenty-four hour customer support is a must," says Lekas. "If someone doesn't offer that, stay away." Test the online support staff by sending a message to see if they answer quickly and if they send a confirmation email with a ticket number, which is a sign of a professional support operation.

Look for companies with online knowledge bases and good tutorials. Hosts such as SimpleHost (www.simplehost.com) and iPowerWeb (ipowerweb.com) have superb Flash-based walkthroughs for novices. Local, smaller companies may give you more personal service and handholding, and they often give design advice, but neighborhood hosts may not be able to grow with you or offer 24/7 support. Also, if you really don't want to deal with Web-design software, you will want to find a host that offers online Web builders, programs that let you construct a site online using a set of templates.

Make The Call

Both Lekas and Barker agree that it is best to call a host's sales team before ordering and arm yourself with questions. First, don't buy on price alone. Ask about typical support turnaround time. "Ask about safeguards on shared hosting," says Lekas. Your initial site will probably reside on a server with hundreds of other small sites, so ask the salesperson what the host does to prevent your site's performance from suffering.

Because most tech enthusiast sites can get unexpected traffic spikes by links from the likes of AnandTech, find out what happens when you outgrow your plan. Always ask what your overage charges will be for exceeding monthly bandwidth or disk space limits. Some inexpensive hosts become very expensive when they charge for overages. Barker recommends thinking six months out and asking if and how this host will be able to upgrade your plan to accommodate growth.

Also, PC nuts are a communicative lot, so consider if your site will have things such as online polls and forums. These functions go beyond simple text and image coding and involve scripts, special bits of code embedded in the Web page HTML code. Ask if the plan includes the ability to run modules written in scripting languages such as CGI scripts. Some hosts

Q&A

iPowerWeb's Thomas Gorney: It's A Service Industry Now

With 250,000 Web sites running off its servers worldwide, iPowerWeb claims to be the largest privately held hosting company in the United States. According to CEO Thomas Gorney, the competition among thousands of hosts remains fierce, but now the battleground has shifted from technology to service and value-adds.

CPU: What have been the major changes in the hosting industry in recent years?

Gorney: When I started in 1995, you got away with 10MB of space and a few email accounts, and that was more than enough. Today, the packages that compete need to be much more attractive. In 2001, we started offering a bundled solution of marketing content, a free domain name, and very generous space, like 500MB plus. Before, the industry was focused on getting the lower-end consumer to upgrade eventually. Now, with the offerings which companies give, there isn't any reason to upgrade.

CPU: Has it gotten any easier to run a site?

Gorney: The industry five years ago and today is the difference between DOS and Windows. Now the average user can simply just log in to the control center and with the click of a mouse, install comprehensive scripts and not have to know the technology behind it and have it on the Web site in a minute.

CPU: How does a consumer ensure against buying into a bogus hosting service?

Gorney: There are thousands of choices, and it's tough to make the right one. The Better Business Bureau (www.bbb.org) is where the better companies are definitely listed, and you can see if they have a positive or negative track record. The main thing I would say is getting a recommendation from a friend or colleague who has a Web hosting company already and knows its ropes.

CPU: If price and offerings are pretty standard among competitors now, what is the next point of differentiation among all of you?

Gorney: Customer service will be the next focus for hosting companies. Now, 24-hour support is almost required for a good hosting company. Next will be low hold times and one-call problem resolution. This is the direction we are going. It is extremely tough to support a Web hosting customer because they will call for any reason. The main thing is that the customer gets better solutions in one call, one request by email or phone, because right now the industry is still not there in terms of service. ■

include a library of premade scripts for gadgets such as shopping carts.

Tools Of The Trade

Once you have server space, your host will give you two name servers, (unique names by which the rest of the Internet already knows your host's servers). You'll need record these addresses so the physical location of your site is associated throughout the Internet with your URL. Now you are ready to build your site.

Almost all hosts will give you access to an online control center, which lets you manage your account, upload files, set up email accounts, and perhaps even design Web pages online. To create custom email accounts, for instance, log in to your control center and enter an email account management area that lets you add however many custom email addresses your plan allots. You can create custom addresses to serve different purposes, such as help@yourdomain.com. Most also give you the option to access these accounts directly through a POP3 email client or have all incoming emails forwarded to another email address.

Design School

Beneath all Web pages are masses of text HTML code. Most beginners don't want to learn this language, so they opt for a WYSIWYG Web-design program. Programs such as Microsoft FrontPage and Adobe GoLive let you compose Web pages and create links graphically and then convert these layouts into the HTML code that the program can upload to your host's servers. Barker still uses FrontPage after all of these years for building OverclockerCafe.com because "you just can't walk away from point and click." Karlins suggests that beginners start with an online page builder from a good host such as GeoCities (geocities.yahoo.com). Frontpage and Dream-weaver are very powerful tools, and buying a book or taking a class is necessary. "I recommend learning one if you're at all serious about your site," Karlins says, "but I'm also cautioning that the learning curve is more than what most of my students initially expect."

For example, FrontPage offers a series of Web site templates for various types of sites and pages and a basic structure to fill in with text and pictures. You can copy and paste text or images from other programs. To create buttons and hyperlinks, right-click the object and type the URL or page into a pop-up box. The program creates the HTML code and the file and folder hierarchy of text code and images that eventually need to get uploaded. In fact, most of these programs have uploading functions built-in so you don't have to manually upload files via an FTP program. In FrontPage, once you design your site offline, click Publish, and you're prompted for your host's server and your login information. A dual-window directory shows the files composing your design on your machine and the files on the server currently on view publicly. Various options let you update the current site only with new elements or upload a whole new design directly from FrontPage.

For PC nuts who love to share images of their projects online, having a decent digital camera is a given, but so is having good photo-editing software such as PhotoShop. To keep page sizes reasonable, you'll need this tool to make image file sizes and quality more appropriate for the Web.

While developing Web-design and photo-editing talents are integral to getting your site online, Karlins warns that "the most critical and underappreciated skill is the ability to organize ideas you want to present." It's easy to become a Web publisher, but the biggest question becomes, what exactly do you have to say?

by Steve Smith

Tips For Finding A Domain Registry

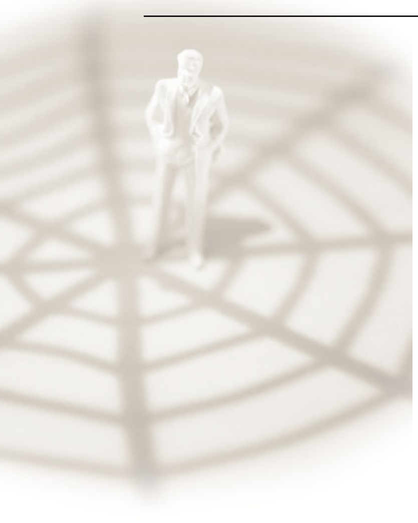
- The best place to start is Internic.com, where ICANN maintains a list of the registrars that are accredited to sell and register domains. All other reputable registrars work through these accredited providers, and they should tell you their affiliation with an accredited registry reseller.
- Don't buy on price alone. See if the registry plan includes domain parking, which will put an under construction placeholder site at the URL until you secure a host and build a site. Another common value-add service, domain forwarding, pushes users who type in your registered URL to a specific site address that may be longer or more complex.
- If the URL you had your heart set on is taken, try putting the URL into NameBoy.com or Register.com, as they will suggest similar alternatives.
- If you can't find your desired domain name with one suffix, try it with .net, .biz, etc. If your original choice is unavailable, try inserting dashes in the name to find a unique variation that is still identifiable as yours.
- For those who really, really want a URL that has already been registered, there is an auction market where you can bid on domain names that others have for sale. Sites such as AfterNic.com and NameWinner.com serve this market. ■

Infinite Loop

Don't Worry; They'll Grow Back

Ivory, bone, gold, silver, porcelain, ceramic, or plastic. The options for dentures have improved over the centuries, but original teeth are still the most desirable. Odontis, a startup company from King's College in London, is developing technology to enable people to regrow their own missing teeth. The procedure involves taking stem cells from the patient, treating and culturing them in a laboratory, and replanting them under the gum at the site of the missing tooth. The implanted cells grow and develop into a natural tooth. The researchers have a long way to go before this procedure is ready for patients though, so in the meantime, don't forget to floss. ▲

Source: www.sciencedaily.com



Coder's Corner: XML

XML Schema, Part 3

Complex Types & Type Declarations

Over the past two months we've introduced the basic ideas of XML Schema, which is an XML-based language for defining structural rules for families of XML documents. In July's issue (page 86) we reviewed the basics, including what XML Schemas look like and how they're similar to and different from DTDs. In the August issue (page 84), we discussed global and local element declarations (a feature not available in DTDs), which let an element have different content rules depending on where that element is in a document.

Last month we also introduced the notion of simple and complex types. The concept of types is core to XML Schema, so it's important to spend some time reviewing this in detail to ensure that the ideas make sense and to show how types work within the overall Schema framework.

Simple & Complex Types

As noted, XML supports two models for element or attribute types: simple and complex. In the simplest terms (no pun intended), simple types are just constrained text strings with no markup or other structure, such as attributes. Thus strings ("hello there!") or real numbers ("1.23e+23") are examples of simple types. In XML an attribute can only be of a simple type because their values have no internal markup structure and can't have attributes.

Complex types, by contrast, are all XML types that aren't simple. In other words, they are things having content models (such as contain elements or elements mixed with text), things having attributes associated with the value, or things having both. Element types can be either simple or complex. They are simple if they allow only text string values (and no attributes) and complex otherwise.

Last month we showed how an element is defined to be of a simple type. The declaration simply references the desired type, such as:

```
<xs:element name=”name” type=”xs:string” />
```

By contrast, elements of complex type are declared using an xs:complexType element inside the xs:element, as in:

```
<xs:element name=”item”> <xs:complexType>
definitions for the complex type </xs:complexType>
<xs:element>
```

In this example, the type rules appear inside xs:complexType. This reflects the fact that XML Schema does not predefine any complex types (unlike the 44 predefined simple types, such as xs:string). As we'll see later, Schema authors can define their own reusable named types (simple or complex), and they can use a type attribute to assign these types to an element.

Defining Complex Types

Rules declared inside xs:complexType define the rules for element content (and attributes) that make up the type. By default, xs:complexType supports only element content. That is, the value can contain elements but no raw text. Consider this example:

```
<xs:complexType mixed=”true” >
```

The attribute mixed="true" changes this so that the example code means the content can contain whatever markup is allowed by the rules inside the xs:complexType, interspersed with plain text. As an illustration, consider the following declaration:

```
<xs:element name=”ex-a” >
  <xs:complexType mixed=”true” >
  <xs:choice> <xs:element name=”heading”
type=”xs:string” />  </xs:choice>
   </xs:complexType>
</xs:element>
```

The declaration means that ex-a elements can contain a single heading element with text before or after, as in:

```
<ex-a> text  <heading> Heading content
</heading> more text </ex-a>
```

There are several elements that can appear inside xs:complexType, but the two most important are xs:sequence and xs:choice. xs:sequence contains a sequence of elements (and/or a sequence of xs:choice or xs:sequence elements) that must always appear in the specified order. Conversely, an xs:choice contains a list of elements (or a list of elements and other choices or sequences) of which you can only choose one. As an example, consider this markup:

```
    <xs:complexType><xs:sequence>
      <xs:element name=”xxx”
type=”xs:string” /> <xs:element
name=”yyy” type=”xs:string” />
      <xs:choice> <xs:element
name=”aaa” type=”xs:string” />
        <xs:element name=”bbb”
type=”xs:string” /><xs:element
name=”ccc” type=”xs:string”
/</xs:choice>
  </xs:sequence> </xs:complexType>
```

The markup means the type value must contain the elements xxx and yyy (in that order), followed by only one of the elements listed inside the xs:choice. Choices can also contain sequences, as in:

```
    <xs:complexType><xs:choice>
      <xs:element name=”xxx”
type=”xs:string” /> <xs:element
name=”yyy” type=”xs:string” />
      <xs:sequence> <xs:element
name=”aaa” type=”xs:string” />
        <xs:element name=”bbb”
type=”xs:string” /><xs:element
name=”ccc” type=”xs:string”
/</xs:sequence>
  </xs:choice> </xs:complexType>
```

The sequences say the value must be either the single elements xxx or yyy or the element sequence aaa bbb ccc. You can have unlimited nesting of choices inside sequence (and vice versa) to build up rich type rules.

minOccurs & maxOccurs Attributes

By default XML Schema assumes each xs:element or xs:choice element calls for one of the indicated elements, choice groups, or sequence groups. However, all these elements support minOccurs and maxOccurs attributes. minOccurs is the minimum number of times the element or group can appear. (The default value is one.) maxOccurs is the maximum number of times the element or group can appear. (The default value is one.) For example, consider the following declaration:

```
  <xs:element name=”xxx” minOccurs
=”0” maxOccurs=”3” ... />
```

This means xxx elements can appear 0, 1, 2, or 3 times (right after each other). Now consider this markup:

```
  <xs:sequence  minOccurs=”2”
maxOccurs=”4”> <xs:element
name=”aaa” .../> <xs:element
name=”bbb” ...> </xs:sequence>
```

This means the sequence ‘aaa bbb’ must occur a minimum of two (aaa bbb aaa bbb) times and up to a maximum of four times. The assignment minOccurs=”0” really means the “particle” (such as an element, a sequence group, or a choice group) is optional. The assignment maxOccurs=”unbounded” means just what is says, that there can be any number of particles.

A particle is shorthand for elements or model groups (choice, sequence, etc.) that form parts of a type declaration. Another important particle is an xs:any, which corresponds to any defined *global* element. Consider this example:

```
    <xs:complexType> <xs:sequence>
      <xs:element name=”xxx” ...  />
<xs:element name=”yyy” ... “ />
      <xs:any maxOccurs=”5” />
  </xs:sequence>  </xs:complexType>
```

It says that the complexType consists of the sequence xxx yyy followed by up to five occurrences of any globally defined element from the default namespace. Note that these must be global elements, which thus excludes any elements (such as xxx and yyy here) defined locally inside an xs:complexType.

Defining Empty Elements

There is a bit of a trick here. Empty elements may seem like simple types, but they're most easily declared as complex ones. Consider this example:

```
  <xs:element name=”foo”>
<xs:complexType> </xs:complexType>
</xs:element>
```

This means that “foo” is an empty element with no attributes. You can easily add attributes to it by putting xs:attribute elements inside the xs:complexType. Piece of cake.

The preceding defined complex types as part of the element declaration. But you can also define a named type and then associate this type with one or more different elements. As an example, consider the following:

```
  <xs:element name=”example2” >
<xs:complexType><xs:sequence> <xs:ele-
ment name=”xxx” type=”xs:string” />
<xs:element name=”yyy” type=”xs:string”
/> <xs:any maxOccurs=”5”
/></xs:sequence> </xs:complexType>
</xs:element>
```

Instead of this, we can create a reusable named type called myBlock, such as:

```
  <xs:element name=”example2”
type=”myBlock” />
  <xs:complexType name=”myBlock” >
<xs:sequence> <xs:element name=”xxx”
type=”xs:string” /> <xs:element
name=”yyy” type=”xs:string” /> <xs:any
maxOccurs=”5” /> </xs:sequence>
</xs:complexType>
```

Now we can assign this type to example2 (or any other) elements:

```
  <xs:element name=”example2”
type=”myBlock” />
```

This is equivalent to how we assigned simple types to elements, except the namespace for the type name is now local.

Named types are reusable, which is a great convenience when there are multiple elements or attributes having the same type. Also, named types let you take advantage of mechanisms for deriving new types from existing ones (defining a new myBlock2 type based on myBlock, for example). How this works depends on the type you're creating; the rules are different for simple and complex types. In next month's article, we'll look briefly at type derivations for simple types. The following month we'll look at the same issue for complex ones.

---

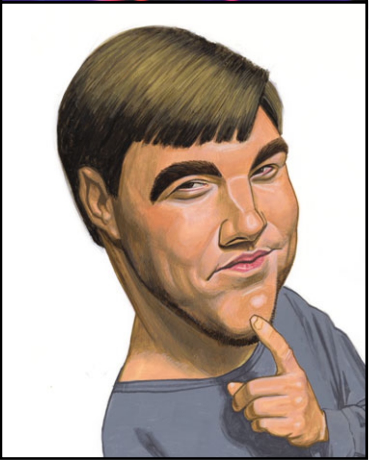
by Ian Graham

(F*ull examples [plus others] are available at* www.utoronto.ca/ian/articles/sep04.)

The Department Of Stuff

by Rob "Cmdr Taco" Malda

openart.txt



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

Open source has demonstrated the true potential of the Internet. Take a thousand people separated by time zones, oceans, and languages, unite them with thin little wires for shuttling bits back and forth and a common desire to build something great, and a few years later, magic starts to appear. It started with the GNU tools and expanded to operating systems, GUIs, and full-blown applications like word processors.

The key to all of this was source code. When you purchase your application from most commercial software vendors, you get precompiled code. With open source, you instead download source code. You take the guts of the program and use your compiler to turn it into spell checkers, video games, or whatever else it is you install on your machine. But the most important factor is that you can take those guts and shape them to your own liking. You can add, remove, or delete whatever part you want. You are limited only by your time and imagination.

Part of why all this was possible was the creation of the tools to build software. None of this would have been possible had GCC (the GNU C Compiler) not been available to anyone who wanted to download it. When that tool became ubiquitous, it became trivial for anyone from college computer science students to corporate programmers to do their own thing. To share with the collective pool. And to contribute to something that, in its own unique way, is art.

Now all of this was great in the '80s and '90s, but we live in a different generation now. First, broadband to the home is common, making it possible for users to transfer gigantic media files—first images, then audio, and now full-blown video streams. Second, we have the tools to take those things and turn them into new things. Apple's iLife suite gives you all you need to mix an album or edit a movie. Inexpensive audio input devices, like the Tascam US 122, make it possible for you to record multiple discrete audio tracks. You can mix that in GarageBand and distribute it via the Internet. Likewise, there are dozens of inexpensive digital camcorders available now. For under a grand, plus the cost of a Mac, you can be a simple film studio.

Now I hope you see where I'm going with this. The open-source movement couldn't happen without source code. Thousands of users sharing the guts of their code with each other, each knowing that there was a chance that someone else might make it a little better. What I'm here to say is that artists can do the same thing! Make your source available. If you mix up a track, share the individual audio tracks that you used to build it. If you edit a short film, share your source to that.

> **People will find your projects and find they also have an itch to scratch. . . . With hundreds of millions of people online, it only takes one to improve your work.**

It doesn't take much. These files tend to be huge, but in 2004, getting large amounts of storage online is pretty inexpensive, and let's be honest, your project probably won't be downloaded by millions, but rather by hundreds.

Now where does the magic happen? People will find your projects and find they also have an itch to scratch. To recut a scene that doesn't quite work. To add background music. To remix a track that doesn't sound right. To rerecord that solo that doesn't sound right. With hundreds of millions of people online, it only takes one to improve your work.

As an artist, it requires you to let go of something that you might have an incredibly strong personal attachment to. But hopefully that same artistic spirit will help you let go of your work and see where it can take you. As long as everyone gives proper credit to everyone else, the worst that can happen is someone takes your art in a direction you don't like. You always have the option to ignore a change that you don't like. People can see your version and decide for themselves.

If you're lucky, you'll meet some cool new people and end up with something far better than you could make individually. It worked for software. It will work for art. ■

Share your art with Rob at malda@cpumag.com

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Forward Slash

by Joan Wood

Productivity Overload

After a decade of video engineering, Joan migrated to game development, co-founding Xatrix Entertainment and producing the two Cyberia titles. As president of indy developer Mango Grits, she talked 3Dfx out of prerelease Voodoo hardware and developed flying game Barrage for Activision, then co-founded and ran hardware review site SharkyExtreme.com as managing editor. Ensconced in Silicon Valley, Joan currently plays with small, wearable PCs and big, rack-mount vis-sim image generators while secretly plotting to save the world through a series of international location-aware multiplayer hand-held games.

The very first topic chosen for this space 33 months ago was instant messaging ("IM: The Message Is The Message," *CPU* December 2001), in which I labeled IM "nothing less than a new form of advanced communication." Well, in today's just-in-time, on-demand world, we need a whole suite of advanced communication methods, and the wisdom to select wisely from this arsenal, because we are drowning in our own productivity tools.

Email has become the logjam of corporate America: Instead of monopolizing one person's time for the length of a conversation, it is possible to address the whole company, thereby compelling each employee to spend time deciphering a message to which everyone (or no one) then feels inspired to respond. Alternatively, it is possible to be hijacked along for the ride on what amounts to a conversation between two people as they exchange dozens of emails, on which you and your colleagues happen to be CCed.

The former situation may call for judicious use of in-house forums posting and the latter should probably be handled via IM or (shock, horror) telephone. Once you get more than 10 people in any group (some say over four), using the proper communication format is as important as message content because if email saturation doesn't get you, instant messaging surely will and death by a thousand cuts is just as fatal, be they machete blows or paper slices. Think I'm being overly dramatic? This may be closer to an understatement.

Email has become the logjam of corporate America . . .

And it doesn't stop there. Web conferencing, however well-intentioned, enables the inefficiency of design-by-committee to expand across multiple locations, but only if the VoIP-induced echo and word clipping doesn't cause audio quality to degrade so far, even that level of communication is not possible.

Just getting that many people to agree (within a minute or two) on what time it is can give a good indication of future cooperation across multiple communication formats. Starting a 'Net meeting on time can be a Herculean effort, requiring participants be emailed in advance and telephoned in arrears to guarantee viable attendance numbers. I don't think this is what we had in mind when we envisioned technology helping facilitate better communication.

Scheduling Web meetings and conference calls through shared productivity applications can be another indicator of communication overload. If getting five people in on the same conversation across multiple time zones requires more than a few days to set up, something is out of whack. If managers are spending half their day in conference calls and the other half wading through email, only getting actual work done at night and on weekends, call 911. You have an emergency.

Corporate training on communication format selection sounds ludicrous until it starts working. Sometimes radical steps are necessary to cure chronic, habitual problems. One very large international corporation chose to enforce "Email-free Thursdays." As the name implies, only first-level emergencies were permitted on that day, allowing for a (relatively) uninterrupted workday at least once per week.

Etiquette also needs to be part of the training as new choices and options are always going to make some a tad uncomfortable. Is it rude to send an email to someone sitting in the next cubicle? What about an instant message? Is chit-chat type small talk necessary before launching into a corporate presentation? Oddly enough, informal user groups have already tackled many of these problems successfully. Active online forums lead to direct email communication when appropriate, and instant messaging serves as another level of inside communication during Web meetings and conference calls, prompting planned discussions, polling consensus, and breaking monotony. We are, by nature, social creatures and we will communicate using whatever method is available.

It shouldn't come as a shock to anyone that PowerPoint is now the standard format for making business presentations. It's reasonably easy to use, quite effective, and widely available. It is a bit surprising, however, to find that it is now a required format for presentations . . . in the 5th grade! Silicon Valley may be slightly ahead of that curve, but you know it's all going that direction, so we better figure this out together. Send out an email conference call notice on that, would you? And copy my mobile phone as I'll be on the road. . . . ■

Send virtual paper to joan@cpumag.com.

by Chad Denton

Road Warrior

Rest Stop Web Access, Mozart Does Wi-Fi, 802.16-2004 Gets The OK & More From The Mobile Front

Some 911 calls made from cells phones Verizon Wireless offers (such as this Kyocera SE47) experience brief drop outs when they have trouble locking on to satellite positions. Verizon Wireless is currently working on a fix.

Verizon Wireless Experiences E911 Glitch

Network providers haven't had an easy time implementing government mandated E911 services into their networks. According to recent estimates, only about 12% of the country is able to track a cell phone caller's location when she calls 911.

Most new phones rely on traditional satellite-based GPS technology or triangulation to locate a caller. The triangulation method tracks the time it takes a signal to reach three cell towers. Triangulation is easier to implement and works indoors, but it only works if the caller is within reach of three towers. GPS is more complicated and only works when the user has a clear line of site to GPS satellites. However, GPS works in rural locations where there may only be one nearby cell tower.

Some phones use a combination of the two techniques. Qualcomm makes E911 chips that it uses in a variety of phones. These chips can use whichever method works best in a given situation. Unfortunately, some Qualcomm customers have had problems with E911 calls.

Verizon Wireless recently noticed a problem with a very small percentage of its calls. In some instances voice conversations dropped out for one or two seconds. The connections weren't technically dropped, but there's some concern that any delay in an emergency situation could cause problems.

The dropouts are actually caused by a resource allocation problem. When the phone has trouble detecting satellites, it uses more processor time than it's allocated. This cuts into the time the processor spends on voice data. Sprint PCS had a similar problem last year, which it fixed in its network software by reducing from 32 seconds to 16 seconds the amount of time a processor can spend locating a satellite. Verizon Wireless is working with Qualcomm on a fix to its problem, which it expects soon. ▲

Roadside Internet Access

Traveling can be exhausting, whether you're driving or flying. Fatigue when you're behind the wheel, however, is just dangerous. In order to reduce the number of fatigue-related accidents, some states are looking into providing free wireless Internet access at rest stops. The hope is that drivers will pull over more often to check email and research local tourist information, such as finding the nearest restaurant or gas station.

Maryland is one of the states to most recently experiment with Wi-Fi-enabled rest stops. By the time you read this, the state should have rest stops along Interstate 95 between Route 32 and Route 216 wired and ready to go. The first 10 minutes will be free with each additional hour costing $4. If the test proves successful, the state will look into providing additional access at other rest stops.

Iowa started a similar test program in June. Under that state's six-month trial, six rest stops on Interstate 35 near Osceola and on Interstate 80 around Davenport and Mitchellville have Internet access. Iowa will look to extend its number of unwired rest stops (reportedly to 40) if the test project is deemed successful. Unlike Maryland, Iowa's Wi-Fi access is completely free.

Of course, when it comes to doing things on a grand scale, no state beats Texas. The Lone Star state started its test program last fall and liked the results so much it plans to install wireless access at all of its 84 rest stops and 12 information centers. Like Iowa, access will be free. The state is also looking at installing an Internet kiosk for users without notebooks. Texas will charge users for access through the kiosk. (Prices were not set at press time.) ▲

Specification? We Don't Need No Stinkin' Specification

We saw it with 802.11g, so it shouldn't be a huge surprise to see companies introducing 802.11n products before final approval of the specification by the IEEE. Airgo Networks, which creates wireless chipsets, has stated that SOHOware, Planex, Askey, and Taiyo Yuden (all Airgo customers) are all planning to release products using Airgo's True MIMO (Multiple Input Multiple Output) technology. Airgo's True MIMO is based on prestandard 802.11n specifications. MIMO transmits multiple data streams over the same radio channel to improve throughput. Experts expect 802.11n to deliver speeds similar to Ethernet (100Mbps).

As with 802.11g, we would expect prestandard 802.11n devices to be upgradeable via firmware. That means early adopters will be able to upgrade and make prestandard devices fully compliant with the official 802.11n specification when it's approved. ▲

We saw firmware-upgradeable 802.11g products well before the standard was officially approved. D-Link's DI-624 also includes upgradeable firmware that lets users get up to 108MBps with other D-Link hardware.

Classic Concerts Go Wi-Fi

If you're like us, you don't fall asleep at the symphony because you're an uncultured brute who's incapable of comprehending the subtleties and complexities of classical music. Rather, you've simply never had the opportunity to learn and appreciate classical music, and a live concert isn't exactly conducive to learning. (Go ahead, lean over and ask the person next to you to tell you a little more about the piece. We dare you.)

In an attempt to get more people to the symphony, some concert halls, including the New York Philharmonic, are testing a device called the Concert Companion, which is essentially a PDA with integrated Wi-Fi and special software. As the concert unfolds, messages flash across the PDA's screen telling the user what to listen for in the next passage. Users can also get more information about the composer and the piece of music they're listening to. The Concert Companion could conceivably run on a variety of PDAs, but the New York Philharmonic is using a specially configured iPAQ. The devices are set up to prevent you from using them for anything other than their intended purpose. (Sounds like a challenge to us.) Rental fees will vary depending on the hall, but $7 to $10 is about average. ▲

Pocket PCs For The Visually Impaired

VisuAide is a company that makes a number of electronic devices for the visually impaired, including a GPS system that uses text-to-speech technology to inform users where they are and where they are going. Recently VisuAide teamed up with HP to create the Maestro.

Based on HP's iPAQ 4150 Pocket PC, the Maestro includes text-to-speech technology and a tactile keyboard that replaces the display. Like iPAQ users, Maestro users can store and recall personal information. The Maestro uses a 400MHz processor and includes 55MB of memory. The only downside is that because the device lacks a display, it may not be entirely compatible with third-party applications. ▲

VisuAide used HP's 4150 Pocket PC as the foundation of its Maestro for visually impaired users. The New York Philharmonic is using the same device for its Concert Companion.

802.16-2004 Approved; WiMAX Coming Soon

Events on the 802.16 front are beginning to speed up. In June, the IEEE approved 802.16d and renamed the specification 802.16-2004. Approval of the specification means we'll likely see 802.16e products on the market in the near future, but don't confuse 802.16e for WiMAX.

There's a lot of room within the 802.16-2004 specification. As a result not all 802.16-2004 equipment will be compatible. Details, including throughput, may vary between manufacturers depending on the interpretation and implementation of the specification. The WiMAX Forum will eventually set a tighter specification and require that all certified WiMAX products meet the tighter specification. The tighter WiMAX standard will ensure compatibility between WiMAX-certified products sold by various manufacturers.

While 802.16-2004 equipment is expected late this year or early next year, we probably won't see WiMAX-certified products until the middle of next year. 802.16e, which will add mobility to the specification, is still pending approval by the IEEE. After receiving final approval, 802.16e will be included in the WiMAX specification.

Intel and Proxim have announced a partnership on 802.16-2004 products. Both companies expect to have products available early next year and will also cooperate in producing 802.16e products. In other WiMAX news, a founding member of the WiMAX organization, Nokia, has returned to the fold. Nokia had left the WiMAX Forum but returned in June. Despite its return, Nokia maintains that it is committed to 3G wireless and Wi-Fi technologies for the near future. ▲

Compiled by Samit G. Choudhuri & Chris Trumble

At Your Leisure

Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in PC entertainment, DVDs, consoles, and just stuff we love, read on.

Ground Control II: Operation Exodus

Conventional, But Very Attractive

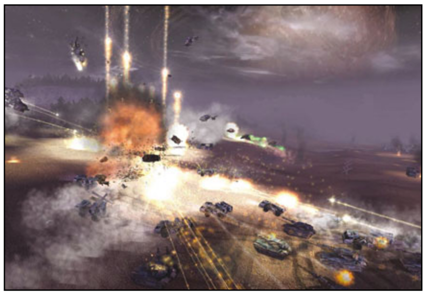
The first thing you notice about GC2 are the beautiful graphics. Rich 3D environments and nicely modeled unit shows Massive Entertainment's attention animation and unit design. You'll be spending the majority of your time with the camera pulled back so you can see more land mass, which is perfect for appreciating the forests and beautifully refracting water. Excellent sound effects and music (the voice acting doesn't touch Blizzard standards) round things off nicely. The auspicious introduction to the audio and visuals leave you with fairly high expectations for the game.

Maybe that's why the ultra-conventional gameplay didn't bowl us over. GC2 follows the tried-and-true RTS rules. However, the ability to use terrain to your battle advantage is a nice touch. If you're a fan of RTS games, this is definitely one to snap up. However, it's worth noting that GC2 won't change your mind if the genre has you rolling your eyes back into your skull. ▲

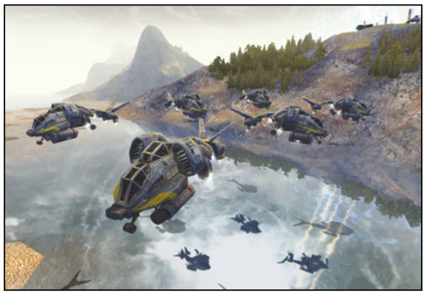
ESRB: (T)een • VU Games

$49.99 (PC) • PC

www.groundcontrol2.com



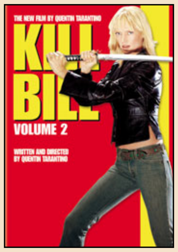
Total annihilation is rather excellent.



Ground Control II features very attractive graphics. Check out the pretty helicopter reflections in the water below.

DVD Byte by Todd Doogan

Next month will be a big release month, but for now there's still a scarcity of must-own titles. On the 3rd, you'll find Jennifer Garner in **13 Going On 30**, as well as Viggo in **Hidalgo**, and two oft-requested TV shows: **Knight Rider: Season One** and **Sliders: The First & Second Seasons**. The 10th is a dead day except Tod Browning's **Freaks** and Tarantino's **Kill Bill: Vol. 2**. The 17th is also ho-hum. You'll find a new special edition of **Goodfellas** and a box set of Scorsese films, Spielberg's **Sugarland Express** finally coming to DVD, **Alf: Season One**, and the first seasons of **Happy Days** and **Laverne & Shirley**. Also look for the Olsens in **New York Minute** and Angelina Jolie in **Taking Lives**. The better release day this month is the 24th because of **The Apprentice: The Complete First Season**, **Ella Enchanted**, and **Futurama Volume Four**. Lest we forget, there's also **The Girl Next Door** and the Prince trilogy: **Purple Rain**, **Under The Cherry Moon**, and **Graffiti Bridge**. The month starts rolling to an end with Mel Gibson's **The Passion Of The Christ**. Going up against it are South Park's parody episode as well as **Jesus Christ Superstar: SE** (the musical), **The Lion King II: Simba's Pride SE**, the original first season box of **Star Trek**, and two Criterion releases: **Slacker** and **Videodrome**. The summer releases crawl away, and slouching toward us next month is the biggest release of all-time (so far). Wait for it. . . . ▲

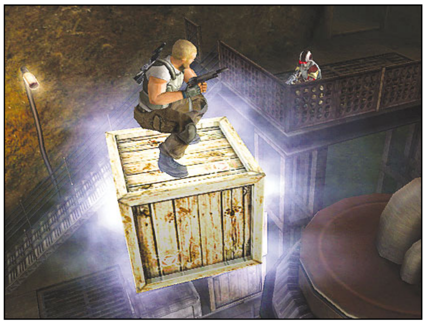

THE NEW FILM BY QUENTIN TARANTINO
KILL BILL
VOLUME 2
WRITTEN AND DIRECTED BY QUENTIN TARANTINO

Psi-Ops: The Mindgate Conspiracy

Head Games

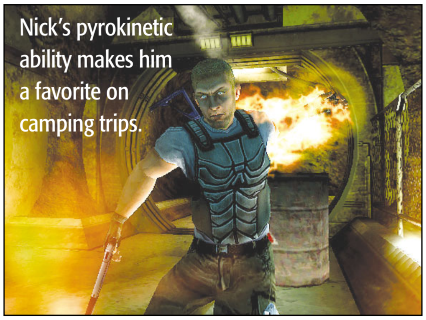
Midway's Psi-Ops: The Mindgate Conspiracy shakes up the third-person shooter genre a bit by giving players access to a well-stocked arsenal of psionic powers to supplement the pistols, shotguns, assault rifles, and so on that you'll use as you battle through the game's levels.

The story follows Nick Scryer, a man with extraordinary mental powers who has his memory wiped clean at the outset in order to infiltrate a terrorist organization known as The Movement. The Movement has its own contingent of psionic agents, and the government wants to send Scryer in to ferret them out. Scryer and what he thinks are his men (normal, nonpsionic soldiers) are captured and a Mindgate agent who previously infiltrated The Movement shows up to set Nick free and give him a shot of something to restore his memory and unlock his power.



Nick Scryer can't fly, but he can levitate items he's standing on.

The shot doesn't work as advertised, however, and Nick doesn't remember who he really is or what he's doing there, but he does recover his powers, although they come back one at a time over the course of the game. As Nick regains more of his psionic powers (which include telekinesis, pyrokinesis, mind drain, mind control, remote viewing, and aura view), the way you'll play the game changes dramatically. Rather than relying on guns to take out the bad guys, you'll find yourself leaning more and more on your newfound powers.



Nick's pyrokinetic ability makes him a favorite on camping trips.

Psi-Ops looks and sounds decent, but Nick's psionic abilities are what make this game so much fun to play. Like the game's standard weapons, your psi powers work in real-time and are fairly easy to control. Midway wisely turns players loose in a world with relatively accurate physics and plenty of interactive elements and lets them develop their own strategies for dealing with enemies. If you can imagine it, you can probably do it, and this freedom, combined with the staggering power you can unleash through Nick's mind, take Psi-Ops in a new and surprisingly fun direction. ▲

ESRB (M)ature • Midway

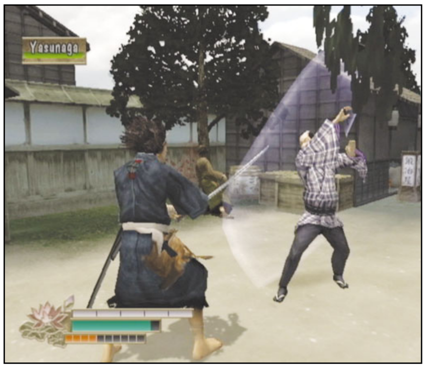
$49.99 • PS2, Xbox

psiops.midway.com

Way Of The Samurai 2

Watch Your Step

Way Of The Samurai hit the PS2 in 2002 and offered some interesting and somewhat innovative gameplay combined with a deep but sometimes awkward combat system. The sequel, not too surprisingly, offers much the same experience; although it lacks a bit of polish here and there, it provides a unique gaming experience that some will find very worthwhile. Set in Japan at the end of the feudal period, the game is the story of a samurai with no master who is wandering in search of a purpose. Reeling from fatigue and hunger, he approaches a small town called Amahara and passes out at the town gate. A young girl shares her lunch with him and helps him survive, after which you control the samurai as he explores the town and looks for gainful employment.



Way Of The Samurai 2 provides plenty of opportunities to test your skill with the sword.

During the course of the game, you'll undertake various kinds of jobs to earn money, and at every step of the way, the decisions you make will affect not only the game's ultimate outcome but also what the denizens of Amahara think of you. If, for example, you go around picking fights without cause and/or dining and dashing in the town's restaurants, word will get out that you're a dishonorable troublemaker, and there will be consequences. When push does come to shove, however, your character is more than capable of protecting himself, and as the game progresses you'll get better and stronger, augmenting your skills with better swords. Control during battle can be a bit dodgy but it's still fun, and we think the game's open-ended story and unusual NPC interaction is more than worth the effort. ▲

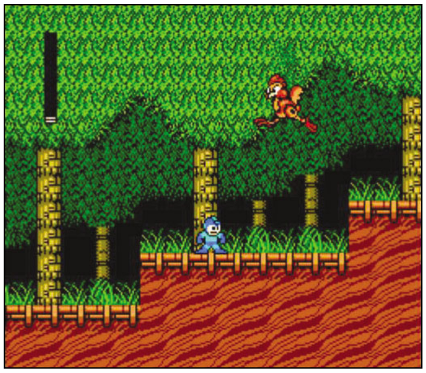
ESRB: (M)ature • Capcom

$39.95 • PS2

www.capcom.com

Mega Man Anniversary Collection

Classic Gaming At Its Best



Old-school graphic goodness.

If you owned an 8-bit NES or knew someone who did, it's fairly likely that you played one or more of Capcom's excellent Mega Man games at some point in your gaming career. If you're unfamiliar with Mega Man, he's a little blue robot with a blaster for an arm who fights Dr. Wily's evil robot henchmen. The old-school MM games were platform games consisting of a series of levels you could play in any order, each of which ended with a boss battle. If you beat said boss, you'd get to use his weapon for the rest of the game, and each weapon was particularly effective against a specific other boss, so the trick to beating the games was knowing what order in which to attempt the levels.

Mega Man strikes a heroic pose. Sort of.

That's the essence of the Mega Man Anniversary Collection, Capcom's recently released compilation of eight of the first Mega Man games plus two hidden bonus games that are new here in the states. The first six titles originally appeared on the NES, Mega Man 7 was for the Super NES, and Mega Man 8 was released on the original PlayStation, and each title in this collection is a direct translation, with graphics and sound perfectly recreated. (There are a few optional extras here and there in the way of updated controls, an autosave feature, and tweaked music in the PS2 version.) As such, the collection won't appeal to folks who demand high-res 3D games, but if you're familiar with the 2D sprites of yesteryear, you'll have a blast running, jumping, and blasting your way through each of these games. ▲

ESRB: (E)veryone • Capcom

$29.95 • NGC, PS2

www.capcom.com/megaman

Self-Contained Retro Gaming

Nostalgic Blasts To The Past

The second Namco 5-in-1 package from Jakks.

The Atari Paddle (13-in-1 TV games) and Namco Ms. Pac-Man (5-in-1 TV games) joysticks are instant blasts from the past. Both offer many joyful hours of nostalgic gaming. Drop in the four AA batteries and plug a unit into a television to have yourself the equivalent of several arcade machines in two friendly, self-contained packages.

Let's look at the Atari first; we recommend the Deluxe 2 Player Set that is available with two paddles for two-player classics, such as Pong. The 13 bundled Atari 2600 games, including the aforementioned Pong, as well as Circus Atari, Night Driver, and Super Breakout will keep kids and nostalgic gamers occupied. You can play any of these games on your PC, but what makes the titles special is the perfectly reproduced paddle (right down to the font!) and analog control. For less than $30, you have family-friendly games that are easy to learn and maddeningly hard to master.

The Namco Ms. Pac-Man joystick includes Galaga, Xevious, Pole Position, and Mappy. The first three games kept us glued to the telly for innumerable hours when we had Far Cry (PC) and Chronicles Of Riddick: EfBB (Xbox) sitting impatiently in the wings. If you ever played these games in the arcade, then you owe yourself the experience of plugging in and playing this on the television.

Two-player Pong will make you weep for joy.

Pole Position plays surprisingly well with the little twist feature found in the joystick; however, after our two-player foray with the Atari paddles, we were disappointed to not have two-player modes with the joystick. Fortunately, we were able to handle our disappointment very well (by playing for several more hours).

We've got one word to describe these self-contained mini consoles: Brilliant. Check out the other offerings on the Jakks Web site. Very highly recommended. ▲

ESRB: (E)veryone • Jakks Pacific

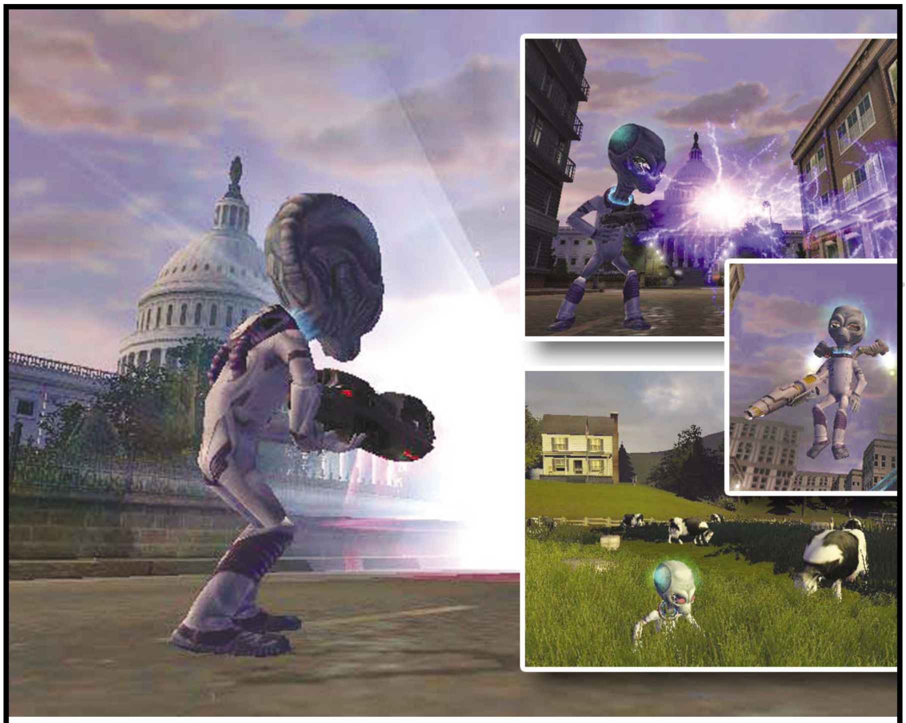
$29.99, Atari 2-Player Paddle

$19.99, Namco Featuring Ms. Pac-Man

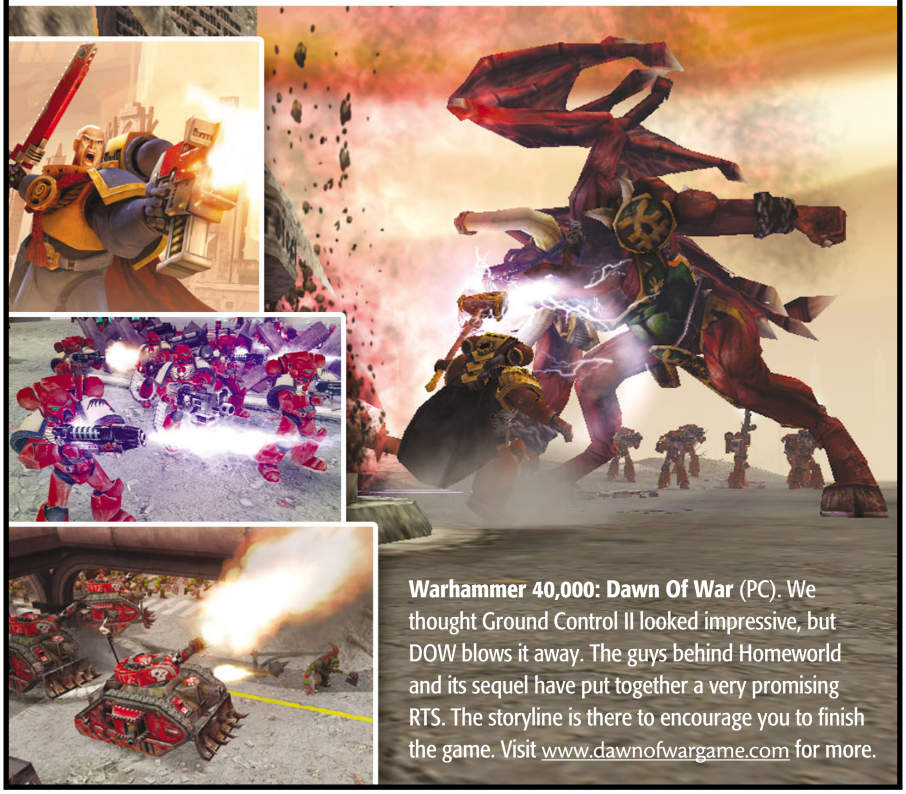
www.jakkstvgames.com

Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Sure, there are those who would have you believe graphics are relatively unimportant in the greater scope of things, but if you read *CPU* mag, you probably already know those folks are off their collective rockers. We want great gameplay combined with stunning graphics, and here are two upcoming games that show promise. Watch for them.



Destroy All Humans (Xbox, PS2). Your brother has crash landed on Earth and is being held at Roswell. It's time to save your bro and wreak havoc on the pesky humans. Think Dungeon Siege with a sci-fi twist. Good stuff. More at www.destroyallhumansgame.com.



Warhammer 40,000: Dawn Of War (PC). We thought Ground Control II looked impressive, but DOW blows it away. The guys behind Homeworld and its sequel have put together a very promising RTS. The storyline is there to encourage you to finish the game. Visit www.dawnofwargame.com for more.

Infinite Loop

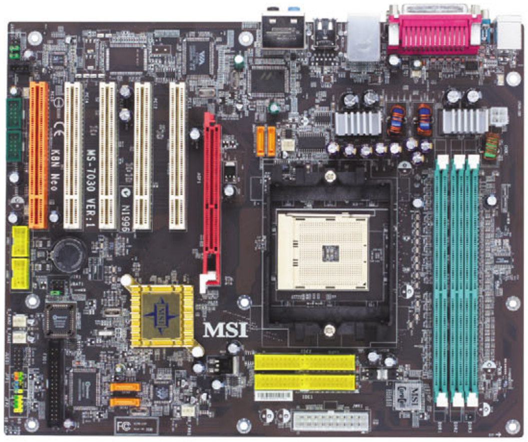
Cure For Cancer?

With modern technology, the possible cure for lethal diseases such as cervical cancer is obviously found in . . . breast milk? According to CNN.com, Swedish researchers have found the HAMLET breast milk compound kills virally infected wart cells in the skin that normally resist conventional medicines. The compound was tested on plantar warts on hands and feet. The warts shrank at least 75% during the first three weeks of treatment, and at least 75% of warts were gone after a second treatment. Dr. Catharina Svanborg, professor of clinical immunology at Lund University in Lund, Sweden, says virally infected and cancer cells are similar. Catherine Laughlin, chief of the virology branch in the Division of Microbiology and Infectious Diseases at the National Institute of Allergy and Infectious Diseases, says that "long-term potential for any devastating diseases is very speculative at this stage" but should be checked up on. The researchers hope to begin testing the breast milk compound on women with cervical cancer soon. ▲

Source: CNN.com

The Award-Winning MSI K8N Neo Platinum Motherboard is Now Available for Purchase!

Experience the 64-bit Computing TODAY!



"If you've been holding out for a better Athlon 64 solution, the K8N is definitely the answer you've been waiting for!!!"
- PC Enthusiast Magazine

"The MSI nForce 3 250Gb took every single synthetic and gaming benchmark tested, leaving us with no doubt as to the new performance leader in the Athlon 64 arena ."
- vr-zone.com

"The MSI K8N Neo Platinum is a truly excellent motherboard that competes in every way with the best of the Socket 754 motherboards."
- Anandtech.com

"It's easy to see that the MSI K8N Neo-FIS2R Platinum is a winner . It outperforms the most popular socket-754 boards on the market."
- GamerDepot.com

"The MSI K8N Neo-FIS2R Platinum is an excellent board to work with …… the performance of the MSI K8N Neo-FIS2R Platinum motherboard was excellent. It's easily the fastest Athlon64 board we've tested to date."
- PCStats.com

"Overall, the MSI K8N NEO was a pleasure to work with and extremely fast to use. From what I have seen, I have no problems with recommending the MSI K8N NEO to your short list when shopping for Athlon64 motherboards."
– HardOCP.com

Also Available Athlon 64 Models:

K8TM-ILSR

K8MM-ILSR

K8T Neo-FSR

K8T Neo-FIS2R

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WWW.MSICOMPUTER.COM
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SOFTWARE TIPS & PROJECTS

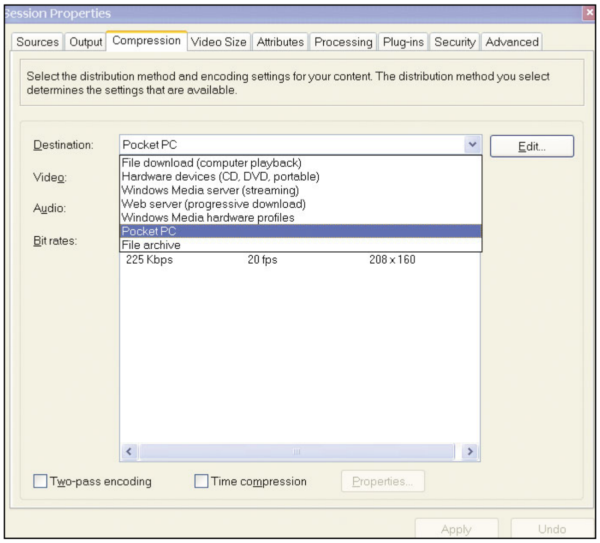
Put Video In Your Pocket

ONE OF THE NEXT BIG THINGS IN CONSUMER TECH IS HANDHELD VIDEO PLAYBACK. MICROSOFT-POWERED PORTABLE MEDIA CENTERS SHOULD be rolling out soon from Creative Labs and iRiver, and the Sony PSP games/multimedia handheld unit arrives in 2005. All of these PDA-sized devices are designed to put video clips, even full-length movies, in your pocket. But, hey, savvy Pocket PC owners already know that they've had this capability all along with the Windows Media Player that comes with recent versions of the Pocket PC OS. The trick is squeezing existing video into the form factors and file sizes that work best on these handhelds.

This month, we will be using the much-overlooked (and free) WME (Windows Media Encoder) 9, a substantial A/V production tool that you can also use to convert video files into Pocket PC-friendly formats. Go to the Windows Media download center at www.microsoft.com/windows/windowsmedia/download/default.asp and use the Select Download and Select Version drop-down menus to download WME 9. You can also use WinXP's Movie Maker 2 to create Pocket PC video, but as we will see, WME gives PC tinkerers such as us an incredible range of options for tweaking big videos down to pocket size.

Crack The (En)Coder

Start WME and click Cancel to close the New Session window. To convert an existing video file, go to the View menu



Select the distribution method and encoding settings for your content. The distribution method you select determines the settings that are available.

Destination: Pocket PC
File download (computer playback)
Hardware devices (CD, DVD, portable)
Windows Media server (streaming)
Web server (progressive download)
Windows Media hardware profiles
Pocket PC
File archive

Video:
Audio:
Bit rates: 225 Kbps 20 fps 208 x 160

☐ Two-pass encoding ☐ Time compression

WME (Windows Media Encoder) 9 has built-in settings for converting and shrinking video and audio streams into more manageable files that can be played back on a Pocket PC.

WinXP Tip Of The Month

Quick Image Resizing

Digital cameras are great, but they tend to produce image files with huge display resolutions and file sizes that are difficult to view and swap. Rather than pull each image into a photo-editing tool to resize manually, you can use a WinXP PowerToy. Go to www.microsoft.com/windowsxp/downloads/powertoys/default.mspx, click the PowerToys For Windows XP link, and under Download, select the ImageResizer.exe file. Once this self-extracting file is installed, simply right-click an image file and click Resize Pictures. In the pop-up window, under Select A Size, you can enlarge or reduce the image to several common screen sizes or click the Advanced button to bring up an option to resize the image to custom dimensions. By default, the program will produce a new resized file when you click OK. You can also right-click groups of highlighted image files to resize multiple files at once. In our tests, the tool reduced file sizes dramatically while doing a fine job of preserving the image's integrity and aspect ratio. It also works on a wide range of image file types and lets you enlarge smaller images to fit your needs. ▲

> **"The trick** is squeezing existing video into the form factors and file sizes that work best **on these handhelds."**

and select Properties Panel (ALT-ENTER) or click the Properties button on the toolbar to define the source material and output formats for the project. On the Sources tab, for Source From, click the File radio button and click Browse to find the file to convert. WME can re-encode .ASF, .AVI, .MPG, and .WMV file formats. Highlight the target file and click Open to make it Source 1, listed in the Source window to the left.

For convenience, you can splice together several video files into a single video to transfer to your Pocket PC. Simply go to the At End drop-down menu at the bottom of the Sources tab and choose Roll Over To Next Source, which tells WME to attach your next source file. Now click the Add button at the bottom of the Source window to add Source 2 to the list. Repeat the same procedures for targeting a second file.

Once you have your source file(s) properly assigned, click the Output tab, click the Archive To File box, and type a file name for the output. Also, make sure you uncheck the Pull From Encoder box above it. Doing this takes WME out of broadcast mode, which is used to stream media to a server or Web site and makes other options available to you later. Go to the Compression tab and select Pocket PC from the Destination drop-down menu. This will apply a series of defaults to your output that makes the file compatible with your Pocket PC, including a 208 x 160 display resolution, as well as 20fps playback, which will help shrink the file size.

You can also use the Two-Pass Encoding option at the bottom of the Compression tab. This recently added feature goes through your source video file once before the conversion process in order to gather more detailed information about the stream for more efficient encoding. With your settings in place, click the Apply button and close Session Properties (ALT-ENTER).

In the main screen, use the Display drop-down menu to select Both, which lets you view both the input and the output as your video is encoded. Click Start Encoding in the toolbar to start the process. The Monitor window displays real-time stats of the encoding process. (You can close this window to get a full-screen view of the input/output displays.) The Encoding Results window pops up to report the end of the encoding with an option to play the result.

Incredible Shrinking Video

Using the defaults, we were able to re-encode a 15-second 628KB WMV file down to a 411KB file. The good thing about using WME is the depth of tweaking it allows. For instance, on the Compression tab in Session Properties, use the Audio drop-down menu to choose Voice Quality Audio rather than CD Quality Audio. When we processed the same 628KB original file with this setting, we reduced the output even further to 358KB. On larger files, that kind of savings can make a big difference, and for many film clips, you do not need CD-quality audio, especially when playing back on a tiny Pocket PC speaker.

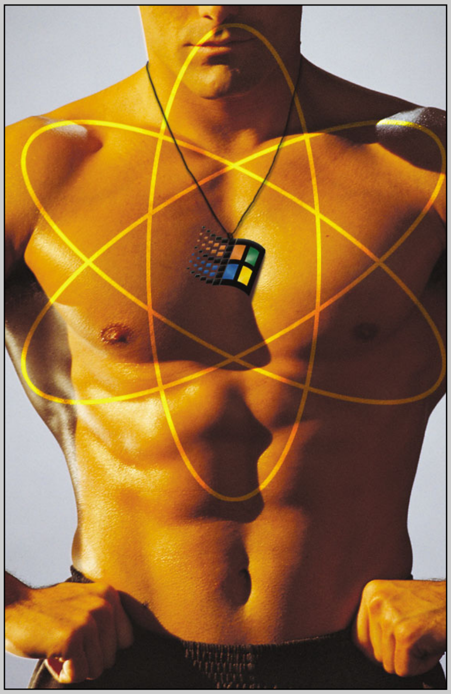
Registry Tweak

Customize Media Player

You can modify the title bar of the Windows Media Player window to reflect a personal or corporate identity. In Regedit, highlight the key HKEY_CURRENT_USER\SOFTWARE\POLICIES\MICROSOFT. Right-click this key, select New and Key. Name the key WindowsMediaPlayer. (This key may already exist.) Right-click the new key, select New and String Value. Name the string TitleBar. Double-click TitleBar and, under Value Data, type in the label you want to add to the Media Player title. Keep in mind that the window will retain the phrase "Windows Media Player Provided by . . ." and end with the phrase you inserted in the Registry. ▲

Infinite Loop

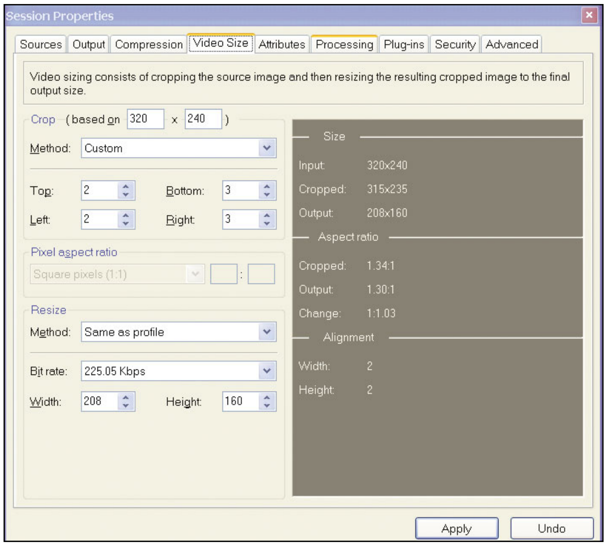
Body Power



With its acquisition of Patent #6,754,472, Microsoft comes one step closer to harnessing the power of the human body. The patent, which outlines a system for both power and data transfer to miniature machines worn by an individual, opens the door for the development of jewelry-sized devices that are too small for conventional power sources.

The Matrix doesn't have you yet, however. As of press time, the company has not announced any intentions to develop this technology in order to create pod-based human power plants. ▲

Source: CNET News.com



Video sizing consists of cropping the source image and then resizing the resulting cropped image to the final output size.

Crop (based on 320 x 240)

Method: Custom

Top: 2 Bottom: 3

Left: 2 Right: 3

Pixel aspect ratio

Square pixels (1:1)

Resize

Method: Same as profile

Bit rate: 225.05 Kbps

Width: 208 Height: 160

Size

Input: 320x240

Cropped: 315x235

Output: 208x160

Aspect ratio

Cropped: 1.34:1

Output: 1.30:1

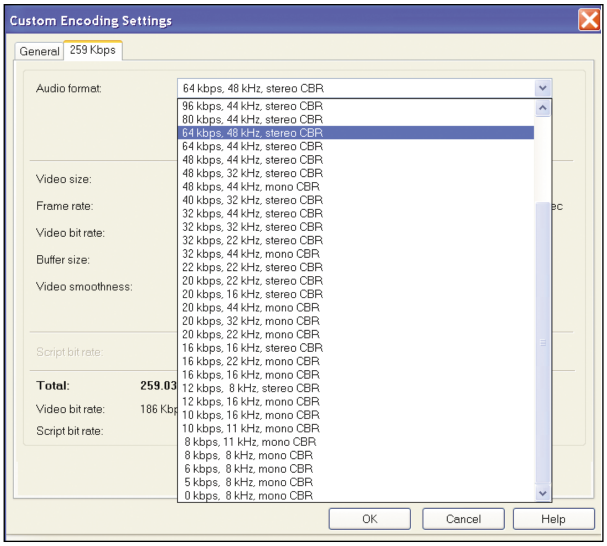
Change: 1:1.03

Alignment

Width: 2

Height: 2

The cropping tool in WME lets you remove the noise and distortion that often come from versions of analog material from a video frame edge.


Custom Encoding Settings
General
259 Kbps
96 kbps, 44 kHz, stereo CBR
80 kbps, 44 kHz, stereo CBR
64 kbps, 48 kHz, stereo CBR
64 kbps, 44 kHz, stereo CBR
48 kbps, 44 kHz, stereo CBR
48 kbps, 32 kHz, stereo CBR
48 kbps, 44 kHz, mono CBR
40 kbps, 32 kHz, stereo CBR
32 kbps, 44 kHz, stereo CBR
32 kbps, 32 kHz, stereo CBR
32 kbps, 22 kHz, stereo CBR
32 kbps, 44 kHz, mono CBR
22 kbps, 22 kHz, stereo CBR
20 kbps, 22 kHz, stereo CBR
20 kbps, 16 kHz, stereo CBR
20 kbps, 44 kHz, mono CBR
20 kbps, 32 kHz, mono CBR
20 kbps, 22 kHz, mono CBR
16 kbps, 16 kHz, stereo CBR
16 kbps, 22 kHz, mono CBR
16 kbps, 16 kHz, mono CBR
12 kbps, 8 kHz, stereo CBR
12 kbps, 16 kHz, mono CBR
10 kbps, 16 kHz, mono CBR
10 kbps, 11 kHz, mono CBR
8 kbps, 11 kHz, mono CBR
8 kbps, 8 kHz, mono CBR
6 kbps, 8 kHz, mono CBR
5 kbps, 8 kHz, mono CBR
0 kbps, 8 kHz, mono CBR
OK
Cancel
Help

Audio format: 64 kbps, 48 kHz, stereo CBR

Video size:

Frame rate:

Video bit rate:

Buffer size:

Video smoothness:

Script bit rate:

Total: **259.03**

Video bit rate: 186 Kbp

Script bit rate:

WME allows for very detailed tweaking of video output, such as audio bit rates, which ultimately affect the size of the media file it produces.

When digitized, some analog video from a VHS transfer or TV signal contains noise or distortions at the top or bottom of the frame, but WME can actually crop a video frame to eliminate this annoyance. In Session Properties, go to the Video Size tab and, in the Crop section, select Custom from the Method drop-down menu. The boxes below let you shave pixel-width display lines from the top, bottom, or sides, one at a time. Setting the Top and Bottom boxes to 5, for instance, will take five lines off the top and bottom of a source video of 320 x 240 resolution, so that it is 320 x 230. The main restriction to using the cropping tool is that you must take the same number of lines off two corresponding sides, so the Top and Bottom numbers must match, as should the Left and Right numbers, or the program will return an error message.

Tweak Your Profile

One of the beauties of WME is it lets you customize the encoding profile to shrink your video even further or to make it compatible with more devices. Again, in the Session Properties window, go to the Compression tab and click the Edit button. The Custom Encoding Settings window lets you modify the current encoding profile and even save it as a custom profile to reuse in another session. For instance, click the Kbps tab. If you want to reduce the file size overhead used by your audio track, you can experiment with different settings in the Audio Format drop-down menu. If the sound rendering is less important to you, try setting it as low as 16kbps, 22kHz, mono CBR, which we found delivered acceptable sound but reduced the size of our original even further to 332KB. Oddly, we did not find that changing the Frame Rate setting down from the default 20 had much effect on the final file size.

Another important function of this profile feature is that it lets you use earlier Windows Media encoding formats that may be more compatible with older Pocket PCs and their versions of the Pocket PC Media player. If your experiments in Pocket PC video don't run on your Pocket PC or give you audio without video, in the Custom Encoding Settings window, click the General tab and use the second drop-down Codec menu in the Media Types section to choose Windows Media Video V7 or Windows Media Version V8.

You can also save these tweaks to the encoding profile for reuse by clicking the Export button and giving the .PRX file a name. Use the Import button to retrieve the profile in any subsequent sessions.

You can use the standard file synchronization routines in Microsoft's ActiveSynch to transfer smaller files to your Pocket PC for playback with its Windows Media Player application. In our experience, however, ActiveSynch transfers can be very slow with very large files such as video, and the program can tend to hang in the process. Typically, a minute of video re-encoded for Pocket PCs still comes to a whopping 1.6MB. The easy way to move your re-encoded video onto a Pocket PC is via the SD or CF cards that most models now have. Get an inexpensive card reader that connects to your PC via USB 2.0 and then simply drag and drop your newly shrunken WMV files onto the card and pop the card into your Pocket PC. If you are really interested in playing video from your Pocket PC, you will want to invest in a card reader like this because next month we will show you how to record and encode TV programs for Pocket PC playback.

by Steve Smith

WARM UP TO PENGUINS

Customize Your Built-In Firewall, Part I

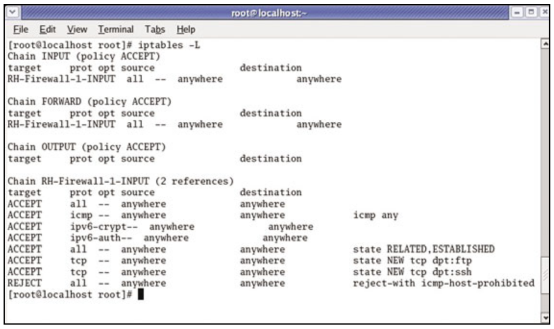
For years Linux has come with a kernel-level firewall that lets you configure your machine to block incoming TCP/IP packets before they reach your network. Those with kernel series 2.4.x and beyond (type **uname -r** to see the version you're using) are using the iptables firewall. Older versions went by other names, such as ipchains. We'll focus on customizing iptables here.

Introduction To iptables

Today, installers and many distros let you do some basic firewall setup, so you may already have iptables running to a certain extent. How you manage the services on your system depends on your distro. You'll have to determine exactly how to stop, start, and restart iptables both immediately and at boot time. We'll focus here instead on customizing the firewall. For the firewall to be present at all, your kernel must be compiled to support iptables. Most mainstream kernels now come with iptables enabled by default. You can see your current firewall settings by typing **iptables –L** at a command prompt as the root user.

If the system displays the following, your firewall is off or you have no rules set:

```
Chain INPUT (policy ACCEPT)
        target     prot opt source
        destination
 Chain FORWARD (policy ACCEPT)
        target     prot opt source
        destination
 Chain OUTPUT (policy ACCEPT)
        target     prot opt source
        destination
```



```
[root@localhost root]# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination
RH-Firewall-1-INPUT  all  --  anywhere             anywhere

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination
RH-Firewall-1-INPUT  all  --  anywhere             anywhere

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination

Chain RH-Firewall-1-INPUT (2 references)
target     prot opt source               destination
ACCEPT     all  --  anywhere             anywhere
ACCEPT     icmp --  anywhere             anywhere            icmp any
ACCEPT     ipv6-crypt--  anywhere             anywhere
ACCEPT     ipv6-auth--  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere            state RELATED,ESTABLISHED
ACCEPT     tcp  --  anywhere             anywhere            state NEW tcp dpt:ftp
ACCEPT     tcp  --  anywhere             anywhere            state NEW tcp dpt:ssh
REJECT     all  --  anywhere             anywhere            reject-with icmp-host-prohibited
[root@localhost root]# █
```

Figure 1. An example set of iptables firewall rules.

If this doesn't display, you'll see extra data between the chain statements. If so, your firewall is running and has rules. Before we look at how settings can look, it's important to understand what you're seeing, even in a firewall's empty state.

iptables stores its settings in chains, which are essentially rules that determine how to handle a single TCP/IP packet. The INPUT chain handles traffic entering the firewall. The FORWARD chain handles traffic destined for IP forwarding. (This chain is used, for example, when you have a cable modem and only one allowed IP address but you have 10 network machines. So, you'd configure one machine's firewall to funnel all the network traffic in and out.) The OUTPUT chain handles traffic leaving the firewall.

You can also create custom chains, plus rules for the default chains that send traffic that the custom chains will analyze. Within each chain it's important to know that your firewall will act on the first rule that matches. Thus, you'll tend to have a chain's rules ordered so that the most specific rules are toward the top and the more general ones near the bottom.

Reading Your Setup

When there are rules inside your firewall, a listing looks something more like what's shown in Figure 1. Here the chain RH-Firewall-1-INPUT (created by the Fedora Core 2 security level GUI tool) will handle all items going to the INPUT and FORWARD chains. The OUTPUT chain is left alone. The defaults for all the chains are ACCEPT, except for RH-Firewall-1-INPUT, which as a user-defined chain can't have a default policy.

Within the RH-Firewall-1-INPUT chain, you'd read the rules from top to bottom. When there's a match to a rule, that rule is then acted upon. Notice the five fields listed in each chain:

- **Target**—the action that's followed if the data packet matches this rule. In Figure 1, there are two targets, ACCEPT (lets data through) and REJECT (bounces data back with an error message). You can see other targets in the iptables man page. (Type **man iptables** at a prompt.)
- **Prot**—the protocol this rule applies to. Typically this is TCP (usually used with continuous connections, such as an SSH login), UDP (usually used for noncontinuous connections, such as getting a Web page), or ICMP (usually used for time measurements with programs such as ping). You can also use protocols listed in /etc/protocols (which is where the "ipv6" items come from). To see which protocol a particular service uses, look in /etc/services. You can use "all" as an option, which you'll see in Figure 1.
- **Opt**—additional rule options, as defined in the iptables man page. None are listed here, which is why the third column only has dashes displayed.

- **Source**—where data that matches the rule is coming from. In this case the rules apply to data coming from anywhere.
- **Destination**—where data that matches the rule is going. Again, these rules apply to data going anywhere.

Now come the actual rules. The first is:

```
ACCEPT    all  —  anywhere
      anywhere
```

This essentially says, "Accept all traffic from anywhere with any protocol that's going to anywhere." More specific rules could follow this, but they would be ignored because the first matching rule is the one that's used. However, each rule in Figure 1 is a partial rule. If you type **iptables -L –v** instead, you get the full rules, which start instead with:

```
Chain RH-Firewall-1-INPUT (2 refer-
      ences)
pkts  bytes     target     prot
      opt       in      out      source
      destination  rule
267   34488     ACCEPT            all
      —         lo      any      anywhere
      anywhere
```

The important addition here is the in (interface) column. This first rule refers only to the lo (localhost) interface, which means "traffic coming from this machine." So, these firewall settings will let the machine talk to its own network services. As we move on, the second rule lets all ICMP traffic in:

```
ACCEPT      icmp  —   anywhere
      anywhere        icmp any
```

The next two entries are:

```
ACCEPT     ipv6-crypt—   anywhere
      anywhere
ACCEPT     ipv6-auth—    anywhere
      anywhere
```

These rules refer to types of IPv6 (Internet Protocol Version 6) traffic. IPv6 is beyond the scope of this article, but in general, the IP addresses we typically use today are IPv4, using the xxx.xxx.xxx.xxx format. IPv6 is what the Internet is transitioning to, basically because available addresses for all the machines operating under IPv4 are running out. In both cases remember that we're looking at protocol types. So ipv6-crypt is a protocol, as is ipv6-auth. You can see the basics of these items in /etc/protocols.

The next rule is:

```
ACCEPT    all  —  anywhere
      anywhere        state
      RELATED,ESTABLISHED
```

This specifies to let in all traffic coming from anywhere and going anywhere using any protocol where the connection's state (in TCP/IP connection-tracking terms) is either RELATED or ESTABLISHED. The RELATED-connection state refers to the packet in question opening an additional connection to supplement an existing one. The ESTABLISHED state means the packet involved is arriving over an existing connection. This can seem like a lot of network-ese, but it's worth learning if you intend to be serious about locking down your network connections. Much of this information is also available in the iptables man page.

The next two rules are similar to one another:

```
ACCEPT       tcp   —   anywhere
anywhere          state NEW tcp dpt:ftp
ACCEPT       tcp   —   anywhere
anywhere          state NEW tcp dpt:ssh
```

These both specify to allow in TCP traffic in which the TCP-specific connection state is NEW (opening up a new connection) with a destination port (the flag displayed in the man page is –dport; dpt is used for display purposes) of FTP for the first rule and SSH for the second. In /etc/services the port for FTP is 21, and the port for SSH is 22. You'll also notice that FTP and SSH use the UDP and TCP protocols. If you aren't careful, you can make FTP or SSH only partially work by blocking off half of their potential traffic types.

The last rule is:

```
REJECT    all  —  anywhere
      anywhere        reject-with
      icmp-host-prohibited
```

This specifies to block all traffic coming from anywhere going to anywhere using any protocol and bounce it back with the error message icmp-host-prohibited. This rule is listed last because if it were first, no traffic would be allowed in (except from localhost).

Difficult & Easy

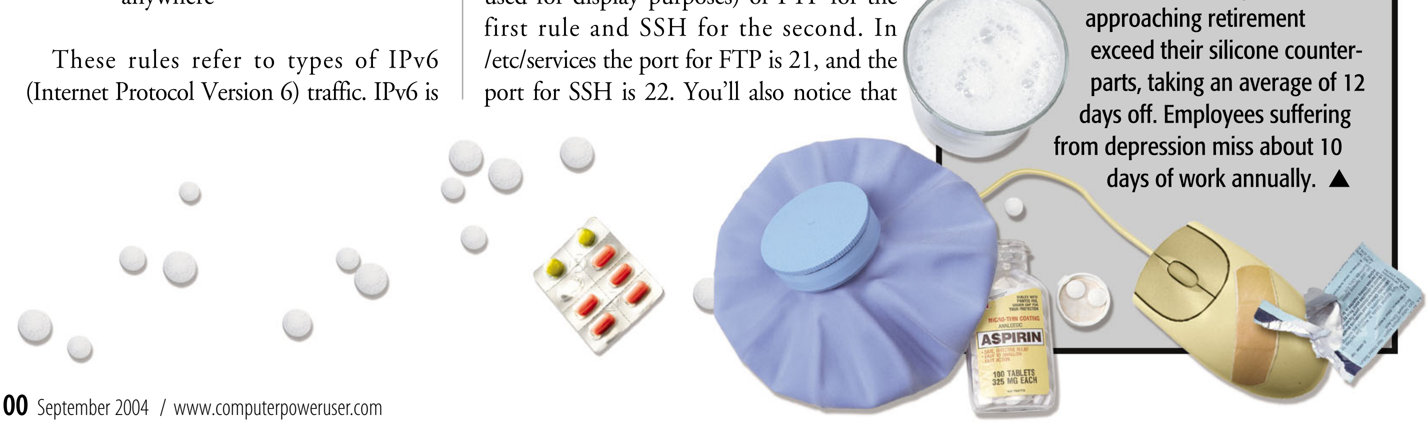
The kernel-level Linux firewall is complex and simple. It's complex when you're first trying to figure it out and simple as you get the hang of it. It's a good idea to learn how to look at its current settings and understand them before looking into how to make changes. Next month we'll discuss how to make actual changes. CPU

by Dee-Ann LeBlanc

Infinite Loop

Sick Computer Got You Down?

A recent Yahoo! survey of 2,500 UK email users indicated that computers take an average of nine days off a year due to sickness due primarily to viral infections and spam attacks. Human viral infections account for roughly seven sick days a year per employee. Only employees between the ages 55 and 64 approaching retirement exceed their silicone counterparts, taking an average of 12 days off. Employees suffering from depression miss about 10 days of work annually. ▲



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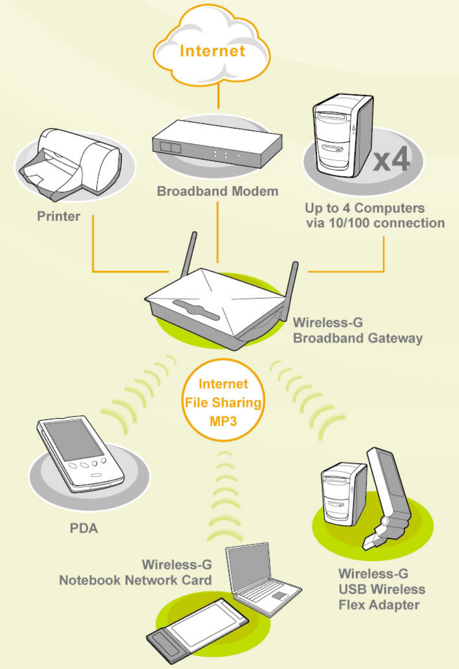
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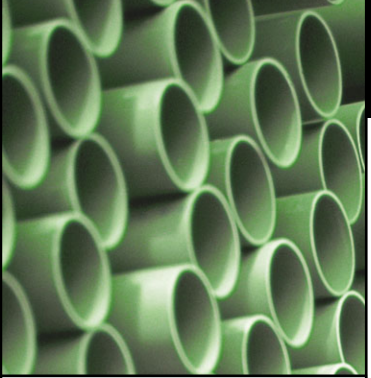
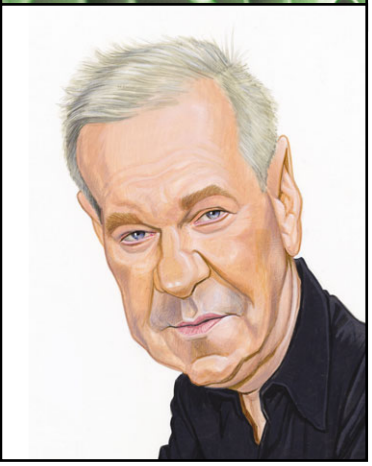


Shavings From The Rumour Mill

by Mike Magee

AMD Readies Dual-Core CPUs



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

Life is getting interesting. By this time next year, AMD will be selling its Toledo dual core desktop chips right at the high end and we suspect Intel's response will be very different indeed. Ever notice how prices on the high-end processors from both AMD and Intel stay at round about the same? This isn't a coincidence. Both companies are similar in everything apart from size. The ex-CEO, Jerry Sanders III, used to work with Intel's eminence gris, Andy Grove, at Fairchild. Intel has about 81,000 employees, AMD about 13,000. Both have factories, both make X86 chips, and both of them are still waiting for Windows XP64 at press time. Up until the end of this year and early into the next, Intel has its Pentium 4 Extreme Edition to sell, and the reason why Athlon FX chips cost so much is because both chips are the flagships. They make more money for AMD and Intel.

Our sources tell us that Toledo could be called the FX-59. We only say that because its FX-57, based on the San Diego core, is the chip that comes out for sale in the first half of next year. Like San Diego, Toledo uses 939 pins and will be built using a 90nm process using SOI (silicon on insulator). But it won't use Cool'n'Quiet, AMD's way of keeping down the heat by regulating the speed, so it's very likely it has some new tricks up its sleeve.

> **During the fourth quarter, AMD will introduce a 4000+ Athlon 64 and an FX-55—both using the 939-pin socket.**

As we've said previously in this column, Intel appears to have ripped up a lot of its roadmaps and is going for all it's worth to produce dual core chips. We wouldn't put it beyond the realms of possibility that it might work so hard on these that it's able to catch up with AMD on the desktop side. It's been working on dual-core chips (we believe) based on the Pentium M technology since at least the beginning of 2004. During the fourth quarter, AMD will introduce a 4000+ Athlon 64 and an FX-55—both using the 939-pin socket. By then, with a fair wind, Microsoft will finally get its WinXP 64 out of the door, and more people will likely be interested in AMD64 and IntelEM64T processors.

AMD hopes to top the 4000+ family in the second quarter of next year, but its 4000+ will already have been out for quite some while by then, and the slightly slower 3800+, 3700+, and 3500+ Athlon 64s will be beginning to proliferate in machines. For people interested in the value PC segment in the second quarter of 2005, AMD will have its value chip called the Sempron, out at 3400+ speeds and using the Socket 754. The older Socket A chips will continue to be produced.

I can't but think that Intel has been consistently wrong-footed for most of 2004—that is if you're talking pure technology. It had to preannounce its own 64-32 chip in February and which, at press time, only exists as a workstation CPU. But there's one thing you should never do, and which I never do, and that's to underestimate the chip giant. It's still consistently profitable, still has plenty of cash in the bank, and still has a huge influence in the marketplace. The very fact it decided to take the 64-32 route means that third-party companies such as NVIDIA, Creative Labs, and software vendors are greatly encouraged to put their muscle behind the effort. I saw documents just a few weeks before I wrote this column from Microsoft that show its developers are taking the WinXP 64 route very seriously indeed. More seriously, it seems that Longhorn, like a mirage in the desert, seems to recede further the closer you get to it.

One question still puzzling me is how Intel will take on AMD in the dual-core field. I still believe it has great plans for its notebook chip, the Pentium M, but if it bases dual cores on this technology, it will have to do a great deal of repositioning of the Pentium 4, whether Prescott, Norwood, or Extreme Edition—and to do that swiftly. ■

Send rumours to "Mad Mike" Magee at Mike@cpumag.com.

Technically Speaking

An Interview With Thad Starner, Director Of The Contextual Computing Group

If Guinness World Records had a category for longest daily use of a wearable computer, Thad Starner would almost surely hold the world record. Starner has been wearing one since 1993. The soft-spoken Starner, armed with a 1999 Ph.D. from the MIT Media Lab, is an assistant professor at Georgia Tech's College of Computing, where he founded and directs the Contextual Computing Group. His research spans everything from a gloveless, real-time sign language recognizer to theoretical frameworks for power generation for wearables. ▲

by William Van Winkle

CPU: Let's start with some basics. How did you get interested in computing?

Starner: Video games. I was born in '69, just at the right time for the whole Atari 2600 thing.

CPU: What finally drove you toward wearables, specifically?

Starner: Well, I was at MIT, which at the time cost about $20,000 a year for an education. I realized that I could either pay attention in class or take good notes, but I couldn't do both. If I took good notes, I wouldn't understand the material. If I paid attention, I would forget it in about two weeks. So, the question was: How do I improve my memory so that my education's going to be worth something? I tried the laptop and different wearables and ended up with a heads-up display and a one-handed keyboard. It was the most efficient in class and also allowed me to take notes out of class, which is where most of the learning actually occurs in research positions. So that's how I evolved to the form factor I currently have.

CPU: When did you actually start using wearables?

Starner: I started in about 1989, but I didn't have anything that I could wear every day until '93.

CPU: You've worn a computer every day since *1993*?

Starner: Pretty much, yeah. We're currently making a new prototype. The one I'm using now as we talk is still in a shoulder bag. The next one I'm looking at is actually in a gun holster, the ones that go underneath your suit jacket. So we're getting smaller and faster and all that. I mean, literally, the computer I have on me right now is the speed of a Cray 3 from 1992.

CPU: From one-handed chording keyboards to finger-motion sensors to speech recognition, what seems to you the best and most promising input methods for mainstream wearables?

Starner: Keyboard. Do you realize that handheld computing now outsells desktops and laptops combined by a factor of 3:1? Last year there were 500 million phone handsets and MP3 players sold that had more power than the high-end desktops of 1990. There were 160 million desktops and laptops sold. I don't know if it's true or not, but *Newsweek* has reported that more people in Japan use their mobile phones for email than their home PCs. A lot of teenagers have gone to using their handsets as their computers. So basically, wearable computing has already won in many senses. A lot of things we did back in the early '90s—augmented reality, memory aids, instant messaging, remote Internet connections, Web browsing, cameras, image capture—all that stuff you can now buy on a new mobile phone.

Now, as far as inputs go, speech recognition is probably not a very good choice because it is socially interruptive. For example, it would be very poor to be talking to my computer when I'm talking to you. You need something that's silent and that you can do while you're doing other things. In other words, the model that Nokia has for the mobile phone is about right. Think of how many teenagers pass notes in class without letting their teacher see. These people are trying to send messages quietly, surreptitiously, and quickly. The only thing that really does that well is typing.

Last year, wireless messaging was $15 million dollars to the service-provider industry. The projections for this year are that something like up to 2 trillion wireless messages will be sent this year. Now, people are typing 10 words a minute using Multitap and T9 and these sorts of things. That's ridiculously slow, especially if you use it for your main email. Can you imagine doing your main email on a mobile phone? That would be ludicrous. My Twiddler [www.handykey.com], the keyboard we use, looks exactly like a mobile phone's 3 x 4 button system, but I do 70 words a minute on it.

CPU: No way!

Starner: That's seven times faster than the current best rate by other methods out there. The only thing that we're doing differently is we're allowing you to hit more than one button at a time. And much to our surprise, the learning rate is so much faster than anything else you've seen in the literature. We just finished formal studies on this. Our average users were at 26 words a minute after 400 minutes of practice. After about 25 hours or so, they were averaging 47 words a minute. Our top person types letter by letter at about 67 words a minute. It's also better for your wrists.

CPU: You mentioned augmented reality. Because the military started research into AR in the mid-'90s, overlaying battlefield data on top of a soldier's view of the land, we've been waiting for the day when we could have virtual first-person shooters with virtual enemies popping out from real buildings or real combatants wielding virtual weapons. Are we anywhere close to having the technology to achieve this in real-time?

Starner: Search the Web for ARQuake by Bruce Thomas. Also you might want to look for AR Human Pac-Man. This is actually a full heads-up display, augmented-reality Pac-Man system using the pathways of the National University of Singapore. You are the Pac-Man wandering around on the paths of the campus, and people remotely are sending ghosts. You even have physical ghosts and can pick up power pellets. So you can see this stuff starting to happen.

CPU: You either crunch data on your belt with a slim wireless network pipe or run a dumb client on your belt with a fat network pipe. Which model makes the most sense for wearables going forward?

Starner: The first. It's the only thing that makes sense. Wireless capacity doesn't go up very fast. However, disk capacity has gone up exponentially per year and will continue doing so for the next 10 years. This means it is more efficient to retrieve 60,000 bits off a flash disk than off of wireless. Trying to do a thin client will just eat your battery alive. Not only that, you can't really do it because ubiquitous networking is an oxymoron. You will never have a ubiquitous network. There will always be some situation where you can't get to the network, and you are going to need CPU, disk, and RAM resources to cache your data so you can work while disconnected.

CPU: You've done a fair amount of research on power generation for wearables. What seems the most promising approaches?

Starner: Well, walking is the one with the most power. You see that in kids' shoes with those flashing LEDs. You can also make keystrokes generate power. Those are probably the most interesting. If you wanted to sit there and wind up something, like one of those Freeplay radios, you can certainly make a wind-up wearable and use it for 30 minutes. That would be really great in the third world.

CPU: In the coming decade, will there be much of a difference between the wearable you use and the everyday units people like your mom will have?

Starner: If you're asking what's going to be mainstream, in the future when you ask a school child to draw a computer, they're going to draw the thing in their pocket as opposed to a PC. If you asked school children to draw a computer 20 years ago, they would have drawn the big tape drives and the IBM mainframe. So in the future, I'll be using the same thing, that pocket. . . . [Our phone connection drops. Starner calls back a minute later.]

CPU: You were right. So much for ubiquitous networking.

Starner: Exactly! But as for this pocket device everyone will use, I suspect it will contain some network, memory, and CPU resources, then wireless peripherals, depending on what you want to do. For example, a wireless keyboard might connect to it for Web browsing. A wireless screen, wireless earphones for MP3 playing. It's not hard to predict this. Take the Apple II from the early '80s. What made them so powerful were the peripherals you could add to them. They could turn into a fax machine or your scanner or your music player or whatever else. Take that same model and put it on the body. Some company will figure out how to do mobile-text entry well and leverage that into taking on Sony and Intel and Microsoft all at once.

What's cool about this is that we've reached a new cusp of computing, from mainframes to micros to PCs and now this new model where we're going to see new winners. It should be very interesting to watch in the next 10 years. CPU

Subscribers can see more content with Thad Starner at
www.cpumag.com/cpusep09/starner.

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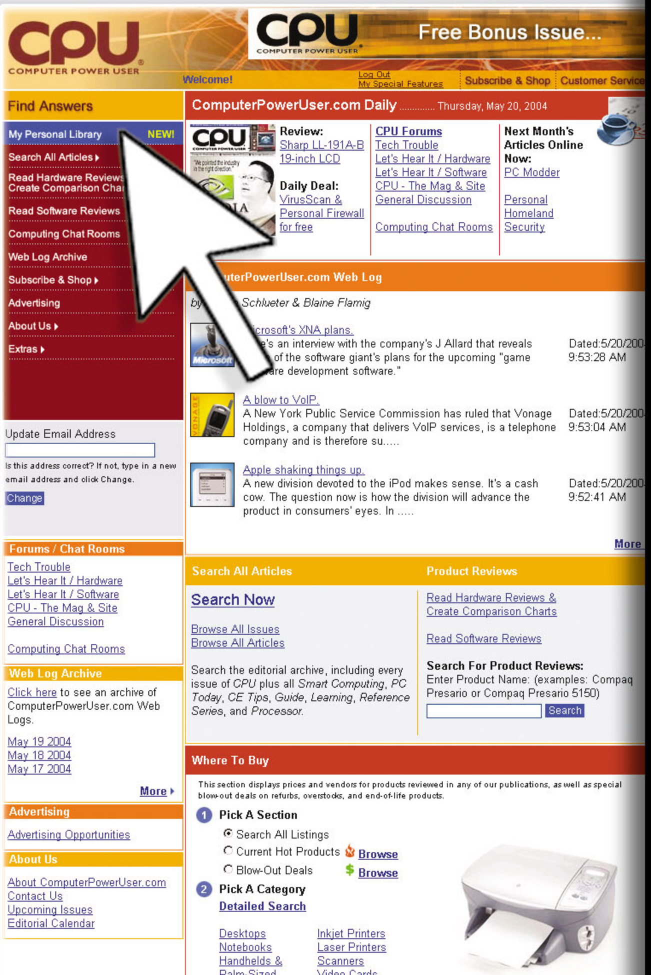

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A Peek At What's Brewing In The Laboratory

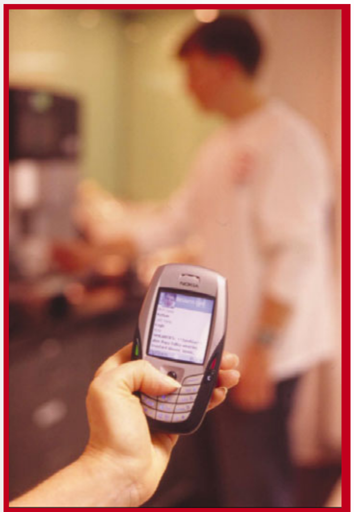
Meeting Someone Platonically? It's Serendipity!

Judging by recent news, you could go weeks thinking Bluetooth is simply an elaborate way to find a date and not a PC peripheral connection technology. (Try Googling "toothing" as an example.) However, MIT graduate student Nathan Eagle is working on a more refined, if not more mature, spin on ad hoc social networking with Bluetooth in a project called Serendipity.

Eagle's MIT group is testing Serendipity on Nokia 6600 Bluetooth phones, although a wide range of BT-enabled smartphones will be compatible with the software. With Serendipity, each user registers a profile on the Serendipity server containing their ID, thumbnail photo, interests, and other data. Users can also weigh their interests. For example, one might be very interested in meeting others into Asian recipes and who read *CPU* magazine but are only barely interested in dating. Because each user's Bluetooth handset constantly sends out a beacon searching for other Bluetooth devices within range, when two Serendipity clients meet, their IDs are sent to the server, and if a match is found, the profiles are sent to the stranger.

We asked Eagle what would happen in a boy-meets-girl-from-same-high-school scenario where the guy wants to meet the girl but she has no interest in him.

"It really just depends on how detailed she makes her profile. At the extreme she will be able to pull up an online list of users who will be introduced to her if she is nearby. She can look through the users from her high school and click the potential intro to the guy off." Presumably, the same would apply for those looking for a professional service but don't want themselves introduced to specific vendors.



Want to meet someone who crochets? The Serendipity project will let your Bluetooth phone make the proper introductions when you are within range of the right people.

Eagle notes that to protect users' privacy, Serendipity employs a trusted third party to supply introductions rather than a spoofable distributed system. He also emphasizes that the Serendipity platform could also adapt to run from cell towers or GPS, although he feels that Bluetooth's 15- to 30-foot range might be the best fit for general use. ▲

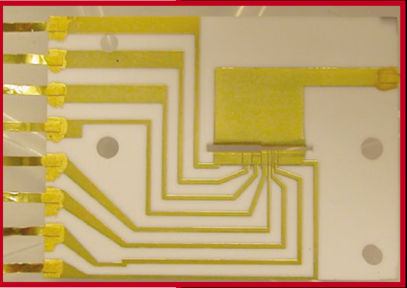
NIST Teleports Closer To Quantum Computing

We're still a long way from a "Star Trek" transporter, but physicists at the National Institute of Standards and Technology and, separately, the University of Innsbruck have teleported properties from one atom to another in an advance that bodes well for the future development of quantum computers.

In the 1990s researchers teleported laser light (photons) using a bizarre quantum phenomenon known as entanglement in which two particles become associated at the quantum level. When a change is applied to one entangled particle, its counterpart exhibits an identical change instantly, even though no other manipulation was applied to it. Einstein once referred to this as "spooky action."

The NIST and Innsbruck groups took a major leap by teleporting complete atoms (calcium and berylluim ions). Because atoms are emerging as a likely medium for data storage in coming years, the ability to teleport them instantly has massive implications. Additionally, if atoms were used to represent binary bits for computation, the ability to teleport those bits within a computer would surpass even the benefits of optical computing, which are bound at best to moving photons at the speed of light.

Like quantum particles, ions can also be entangled. The NIST demonstration used lasers to manipulate the quantum states of three ions and entangle them. Researchers then destroyed one ion's quantum state and teleported that state to another of the entangled ions. This was done inside an ion trap made of gold electrodes deposited on alumina. One key advance the NIST team showed was that it was able to separate the ions without breaking their entanglement. Moreover, they initiated the teleportation deliberately with the push of a button rather than unpredictably in a test chamber. This is still a long way from saying, "Energize!" but it's a step in the right direction for ultrafast computing. ▲



This gold-on-alumina ion trap was the stage on which NIST and Innsbruck researchers were able to teleport whole atoms, paving the way for future computing and storage systems.

by William Van Winkle

Power Gets Under Your Skin

Thermoelectric technology from Biophan may soon be able to power implantable electronics by harnessing the temperature delta between the inside of your body and just under your skin.

In the outer solar system, our sun is little brighter than the millions of stars comprising its backdrop, and deriving power for a spacecraft via solar cells is impossible. Instead, NASA equips its ships with a thermoelectric thin film with one side pointed toward the Sun and the other toward deep space. The slight temperature delta between the two is just enough to let the power system convert the thermal differential into a bit of electricity—a phenomenon known as the thermocoupling effect.

Biophan Technologies recently acquired a patented approach to take this thermoelectric technology and adapt it for use inside the human body. In many places in the body, there is a 2- to 3-degree (Celsius) difference between the temperature just under the skin and deeper inside. Using sensors the size of one or two postage stamps, Biophan can generate about 50 milliwatts of power, enough to power a pacemaker or trickle-charge a defibrillator battery. With more and larger sensors, the system can generate more power.

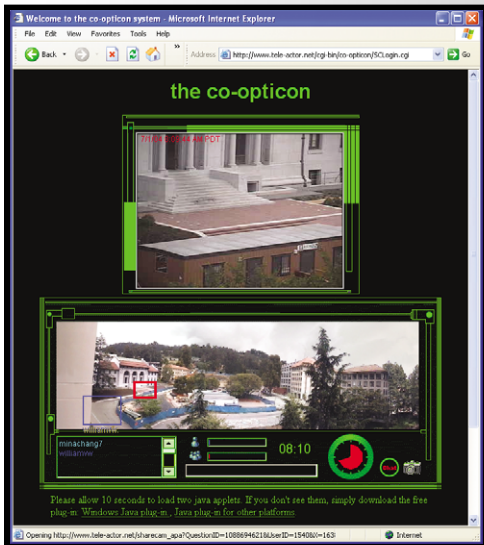
"An artificial heart needs like 10W," says Biophan CEO Michael Weiner, "and while a person generates that much heat across his entire body, capturing it all isn't something we're thinking about. Our target is all the miniature devices going into the body: sensors, drug pumps, pacemakers, neurostimulators, and future things. You'll see more and more diagnostics in the body, some of which will be therapeutic. One company has a device in development that has a GPS built in so that if the person has a heart attack, they know where he or she is. But that will obviously have greater power demands."

Interestingly, Biophan was careful to make sure that its technology would work in most any environment.

"There's a circuit that measures polarity and temperature change," says Weiner. "So, if you went from an air conditioned office out to 108 degrees outside, like you're laying out by the pool in southern Texas, it would change so that the flow would change direction. Instead of 98 degrees on the surface of the skin and 101 on the inside, it might go to 101 on the inside to 105 on the skin. The polarity switches and keeps providing power."

According to Weiner, biothermal power is something that gets installed as part of a new implant, not something you retrofit into existing implants. Although Weiner is reluctant to speculate about applications beyond the medical field, many expect certain low-power devices moving from being worn externally to being implanted subcutaneously. Biothermal-power technology might be the key that enables such a transition.

Weiner expects Biophan's biothermal technology to reach the market in various products within two to three years. ▲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Say we have one electronic eyeball among us but want to look in different places. Software being developed at UC Berkeley will help make sure we all stay satisfied.

10,000 People, One Eye

The day is coming when remotely controllable, motorized Web cameras will be widely available to the public. But if you want the camera to look one way while your counterpart across the country wants it to look somewhere else, you have a problem.

"For a while, we've been looking at people sharing resources, whether that's a camera, a robot, or some experimental apparatus," says Ken Goldberg, UC Berkeley engineering professor. "The problem is when a lot of people want to use them at the same time. The naive thing to do is just take an average of all the viewer requests. But if a bunch of people want to look at the left and a bunch at the right, the camera would look in the middle—a very bad solution. You need to be more sophisticated. We characterize it as an optimization problem, and we've developed a series of algorithms to solve for that."

You can play with the test bed for Goldberg's work at www.tele-actor.net/co-opticon. The co-opticon camera overlooks a section of the Berkeley campus. Remote users see a wide-angle panorama of the camera's possible field of vision within a Java-based browser interface. They then use a mouse to click and drag on an area where they want the camera to focus. Part of the interface displays indicators for your request satisfaction, plus all users' satisfaction.

"We've found that people like to watch people walking around," says Goldberg, "so viewers tend to focus on the foot traffic corridors. Then there's a lot of interest in the construction going on. In fact, we've found that our biggest user is the manager of the construction site. He uses it every day to check in on his workers. At night, users tend to look in the windows because then you can see in them."

Voyeurs, pause there. The co-opticon's resolution isn't sufficient for making out small-scale details, although the project just received a new camera from Panasonic, which is interested in licensing the group's software. Major funding has come from Intel and the National Science Foundation. ▲

Q&A With Tiffany Shlain

Tiffany Shlain could be called the First Lady of the Web. She might not be one of its architects, but she is definitely one of the medium's biggest supporters and ardent advocates. Shlain co-founded The Webby Awards (which is accepting entries as of Sept. 15 at webbyawards.com) at a time when broadband was still a twinkle in the eye of standards committees and AOL dominated online access. Filmmaker, activist, "Good Morning America" Internet expert, visionary, and more, Shlain has accomplished more in the tech world at age 34 than most will achieve in a lifetime.

Q Tell us about the first Webby Awards.

SHLAIN: I was planning it before the boom, but then the night it happened, it got international press and the boom was starting. It was like lines around the block to capacity, and it just struck some nerve at the right time. And we approached it with irreverence because I personally hate award shows. I should reframe that. I hate the painful acceptance speeches in the traditional award show model. So the first thing we instated was the five-word acceptance speech rule. It's been one of my favorite parts of the annual show. We struck the right tone and had wonderful judges, and I think that was important.

Q Did the end of the tech bubble impact the Awards?

SHLAIN: After the crash, everyone was saying, oh, it was all hype. It was all a fad, smoke and mirrors. But we all know today that everything we were promising happened. Just the timeline was wrong. And the focus on just money was wrong because, as we can all see, it's just been an unbelievable communication tool. It's a political tool, a media tool, a commerce tool. The Web has this great capacity, and I don't even think we've even seen the beginning of it.

Q How is it being one of the few standout women in the computer and Internet field?

SHLAIN: It's interesting. Women still are only penetrating like 13%, a very small percentage, of leadership positions in politics and companies. We're still every day in new terrain with balancing work and motherhood. I don't know why there aren't as many women in technology. My sister's an artist, and she uses the computer to do graphics. She said somebody introduced her at a party as, oh, she's really into computers. She said, 'I felt like that was like saying, oh, she's really into paintbrushes.' The computer, the Web, is a tool. I think the more that people actually really understand the Web as a tool, not like a thing unto itself, but as a tool to help you do other things, you're going to see more women in this field.

Q Do you think that one reason for this inequality is that technology is presented to women differently than men in our society?

SHLAIN: That's a good way to ask it. I think that in schools, they make technology the thing instead of the tool. It's a hard thing to articulate. I'm actually thinking about writing a whole book on this subject, about making things happen, being a woman, being a leader in the 21st century, and using the Web to make those things happen. I wonder if that's like a right brain, left brain issue. I don't know. It's a great question, but I don't have the answer.

Q Do you think the Web has the potential to promote good information or disinformation any more or less than traditional media?

SHLAIN: People are going to need to develop a Web literacy. When video-editing technology became pervasive, people began to learn how manipulative cutting and editing or showing a shot a certain way could be. People are very image savvy now. In that same element, people need to become much more Web savvy. You still need to have the same kind of filter of morals and ethics and suspicion, skepticism, of where you're getting your information.

Subscribers can go to www.cpumag.com/cpusep04/schlain for bonus content.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside of Portland, Ore.

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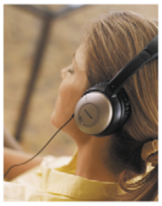

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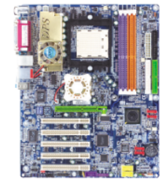

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